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RECORD OF REVISIONS

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be mounted horizontally in a 24-inch equipment rack. Mounting holes are provided for either position in the top plate casting.

2.6.2 Environment

The tape transport is to be operated in an ambient temperature range of +36 degrees F to +122 degrees F (+2°C to +50°). It is recommended that any heat dissipating devices be mounted above the unit to avoid exceeding their temperature limits. The device may be exposed non-operationally to temperatures between -50 degrees F and +160 degrees F (-45°C to +71°C). Humidity conditions from 15% to 95% (non-condensing) are suitable for operation of the Tape Transport System.

2.6.3 Power

The input power requirements for the TDI 1050 Tape Transport are selectable from 100/120/220/240 $\pm 10\%$ at a power rating of 300 watts maximum.

2.7 INITIAL CHECKOUT PROCEDURE

Initial procedures for power-up and system checkout are as follows. It is not necessary to mount the tape transport in the equipment rack for these tests. The following tests may be performed with the tape transport mounted in the shipping frame.

2.7.1 Primary Power Application

Primary line power is applied to the tape transport via the power cord included with shipment. This cord should be connected between the receptacle at the rear of the power supply and the appropriate power source, (100, 120, 220, 240 volts). If the wrong line voltage is specified on the identification label as shown in Figure 2-7, refer to Figure 2-6 and perform the following procedure:

1. Slide the protective fuse cover (located at the rear of the power supply) upwards to uncover the line power fuse.
2. Remove the fuse by pulling the FUSE PULL tab.

3. Remove the voltage selection PC board. Re-orientate the board so that the desired voltage value appears at the upper right side (See Figure 2-6). Reinstall the board in the slot.
4. Reinstall a fuse of the proper value, (See Table 2.1.) then slide the protective cover back in place.

TABLE 2.1. LINE VOLTAGE/FUSE SELECTION

LINE VOLTAGE RANGE	VOLTAGE SELECTED	FUSE REQUIRED
90-110	100 VOLTS	6 AMP
108-132	120 VOLTS	
208-242	220 VOLTS	3 AMP
218-264	240 VOLTS	

2.7.2 Initial Checkout

The functions of all controls and indicators are described in Section III, Operations. The following procedure is provided to verify that basic transport functions are operational, either before the unit is installed in the equipment rack, or before system interface cables are connected.

1. Check the identification label at the rear of the top plate (See Figure 2-8.) to verify that the primary power requirements coincides with the line voltage at the installation site. If power requirements must be altered, refer to paragraph 2.7.1.
2. Connect the power cord between the receptacle at the rear of the power supply and the appropriate line power outlet.
3. Apply primary power by depressing PWR switch.
4. Enter Operation Quick-Check by depressing WRT ENB and LOAD switches with no tape mounted.

READ DATA (RDP, RDO through RD7):

In the NRZI mode the individual bits of each data character are assembled into parallel form by a one-stage deskewing register. The complete character can be obtained by sampling these read data interface lines simultaneously during the read strobe period, (RDS). The read data lines prepared for the next character by resetting 0.5 microseconds after the trailing edge of the RDS. In PE mode these lines contain the phase encoded data read from tape. Although when reading new tapes on the same transport on which they were generated produces transition spacing within the drives tolerances, considerable variation should be expected when reading tapes of unknown age, use and origin. For NRZI mode the RDS and the corresponding read data lines can indicate, for any two adjacent characters, spacings from approximately 50% to +150% of the nominal spacing. For phase encoded tapes, deskewing logic should be capable of tracking variations up to $\pm 50\%$ of the average spacing between two adjacent flux reversals.

READ DATA STROBE (RDS):

This is a pulse for each data character read from tape. Note for the NRZI mode that the nominal time between adjacent RDS pulses averages $\frac{1}{DV}$, where D = density and V = tape velocity. When phase-encoded data is being read, a read data strobe is not available.

2.10 INTERNAL SWITCH AND JUMPERS

The TDI 1050 series transport is equipped with two DIP switches on the I/O Interface board and a series of lift-off jumpers on the main electronics board. The positions of these switches and jumpers are preset at the factory and normally require no further attention by the user. DIP switch functions are defined in Table 2.4. The functions of the available jumper connections are listed in Table 2.5. Both tables show the as-delivered configuration.

TABLE 2.4. STANDARD TDI 1050 I/O DIP SWITCH FUNCTIONS

SWITCH	POSITION	FUNCTION IN <u>ON</u> POSITION	STANDARD CONFIGURATION
1L	1	Provides +5V power to pin S of P101 when external power is required.	OFF
	2	Provides ON LINE and SELECT gating (OFF provides SELECT-ONLY gating)	ON
	3	UNUSED	OFF
	4	UNUSED	OFF
	5	Enables SELECT 0	ON
	6	Enables SELECT 1	OFF
	7	Enables SELECT 3	OFF
	8	Enables SELECT 2	OFF
1E	1	UNUSED	ON
	2	Disables low speed status	ON
	3	Disables single gap status	ON
	4	Disables 7 TK gap status	ON

TABLE 2.5. MAIN ELECTRONICS BOARD JUMPER FUNCTIONS

JUMPER	FUNCTION	AS DELIVERED IN/OUT (9-TRACK VERSION)
E4 to E5	Test Option 3	IN (Disabled)
E13 to E14	Test Option 2	IN (Disabled)
(E7, E8, E9)	Power On Reset Disable	OUT (Enabled)
E10 to E12	Off Line Test Mode	IN (Disabled)
E16 to E17	Test Option 1	IN (Disabled)
E21 to E22	Remote Unload	IN (Disabled)
E26 to E27	LOL Disabled	IN
E24 to E25	LOL Enabled	OUT
E34 to E35	Dual Stack Head	IN (Enabled)
E36 to E37 *	7TRK/800 BPI*	OUT (Disabled)
E28 to E29	Density Select from Front Panel	IN (Enabled)
E30 to E31	Remote Density Select	OUT (Disabled)
E32 to E33	Fixed 1600 CPI Density	OUT (Disabled)
E39 to E40	Trailing Edge WDS	IN (Enabled)
E2 to E3	Test Capability	IN (Disabled)

*** NOTE**

When jumper E36 to E37 is in place for a 7-track machine, the E34 to E35 jumper must be moved to the E35 to E46 position.

2.11 RESHIPMENT

When reshipment of a TDI System becomes necessary, it should be packed in the shipping containers in which it was delivered in accordance with the following procedure:

1. Remove unit from system installation.
2. Attach shipping frame.

CAUTION

When attaching the tape transport to the shipping frame, remove all obstructing objects (pawl fastener; interface cables; etc.) between the top plate and the shipping frame. If the attaching screws are tightened when an obstruction is present, breakage or severe warping of top plate may occur.

3. If the tape transport is to be packed for shipping purposes, use the original shipping carton.
4. After sealing the first carton, tape the four corner pads in place. Slip outer carton over inner carton.
5. Secure outer carton. Prepare for shipment.

2.12 SUBSTITUTE SHIPPING CONTAINER

If the shipping frame but not the original container is available, a suitable substitute may be constructed as follows:

1. Select a heavy carton of correct size to snugly accept the transport.
2. Place the first carton in a large carton with a minimum clearance of 2-inches all the way around.
3. Pack carton with foam on all six sides or use preformed corner pads.
4. Seal outer carton, prepare for shipment.

WARNING

DO NOT attempt to ship the transport without the shipping frame.

SECTION IV

THEORY OF OPERATION

4.1 INTRODUCTION

Basic operational theory describing the TDI 1050 is given in this section.

The TDI 1050 is a compliance-arm type synchronous digital tape transport which generates and reads ANSI, IBM and ECMA compatible tapes in both PE and NRZI formats and in both 7-track and 9-track versions. In all cases, data format and computer interface requirements are performed by electronics not provided with the basic model. However, an integral formatter is incorporated with the TDI 1053 and 1054 models. The scope of this discussion is limited to the model TDI 1050.

4.2 DESCRIPTION

Performance specifications applicable to the TDI 1050 are shown in Table 4.1. Provisions within the unit permit operation with or without daisy-chain capabilities.

Magnetic tape units are peripheral components in data processing systems requiring storage and retrieval of vast amounts of data without errors. The TDI 1050 has been designed for easy operation with industry compatible interface standards and simple maintenance. Safeguards are built-in for tape handling protection during normal operation.

Mechanical and structural integrity are developed by a single-casting, strain relieved top plate, which supports all mechanical and electrical

TABLE 4.1. MECHANICAL AND ELECTRICAL SPECIFICATIONS

Tape (Computer Grade)	
Width	12.649 ± 0.051 mm (0.498 ± 0.002 inch)
Thickness	38.1 microns (1.5 mil)
Tape Tension	2.224 ± 0.1.39N (8.0 ± 0.5 ounces)
Reel Diameter	26.67 cm (10.5 inches) maximum
Reel Capacity (38.1 micron tape)	731.52 m (2,400 feet)
Recording Mode (IBM, ECMA and ANSI)	9-track 630 c/m (1600 cpi) PE or 315 c/cm (800 cpi) NRZI
Standard Tape Speeds	114.3, 95.25, 63.5 47.625, 31.75 cm/s (45, 37.5, 25, 18.75, 12.5 ips)
Instantaneous Speed Variation	± 3%
Long Term Speed Variation	± 1%
Rewind Speed	5 m/s (200 ips) average, 10.5 inch reel
Interchannel Displacement Error	
Read	2.54 microns (100 μ in)
Write	Electronically Compensated
Start/Stop Displacement	4.826 ± 0.5080 mm (0.19 ± 0.02 inches)
Beginning of Tape (BOT) and End of Tape (EOT) Detectors	Photoelectric IBM Compatible
Weight	38.56 kg (85 pounds)
Dimensions	
Height	60.96 cm (24.0 inches)
Width	48.26 cm (19.0 inches)
Depth (from mounting surface)	36.195 cm (14.25 inches)
Cable Clearance	5.08 cm (2 inches)
Operating Temperature	2°C to 50°C (36°F to 122°F)
Non-Operating Temperature	-45°C to 71°C (-50°F to 160°F)
Operating Altitude	0 to 6,096 m (0 to 20,000 feet)
Non-Operating Altitude	0 to 15,240 m (0 to 50,000 feet)
Power	
Volts ac	100, 120, 220, 240 ± 10%
Power (maximum on high line and worst case command rate)	300 Watts
Frequency	48 to 400 Hz
Mounting	Standard EIA Rack, 19-inch vertical or 24-inch horizontal
Electronics	All Solid State, Standard Parts

SECTION V

PREVENTATIVE MAINTENANCE

5.1 INTRODUCTION

This section contains procedures for maintaining the equipment in optimum working condition. Corrective maintenance procedures involving disassembly, re-assembly, etc. of the transport are provided in Section VI.

5.2 PREVENTATIVE MAINTENANCE SCHEDULE

The TDI 1050 should be cared for on a regular basis as shown in Table 5-1.

TABLE 5.1. PREVENTATIVE MAINTENANCE SCHEDULE

MAINTENANCE OPERATION	FREQUENCY	PARAGRAPH
1. Clean head assembly, tape guides and capstan.	Daily	5.3 5.5
2. Clean ceramic tape cleaner.	500 hours	5.4
3. Clean housing and dust cover door.	As required	5.6

5.3 HEAD ASSEMBLY AND TAPE GUIDE CLEANING

NOTE

To gain access to the head assembly and tape guides, lift off the two-part head assembly dust cover.

Clean the components with a lint-free, non-abrasive swab moistened with isopropyl alcohol or head cleaner (Miller-Stephenson MS200 or equivalent). Wipe off excess cleaner and allow components to dry before replacing the dust covers. Clean areas shown in Figure 5-1.

Clean Roller Guides 1 and 2, upper and lower compliance arm guides with a lint-free, non-abrasive wipe or a cotton swab moistened with isopropyl alcohol or head cleaner. (Miller-Stephenson MS200 or equivalent)

CAUTION

Do not soak the guide with cleaner. Excess solvent may break down the bearing lubricant.

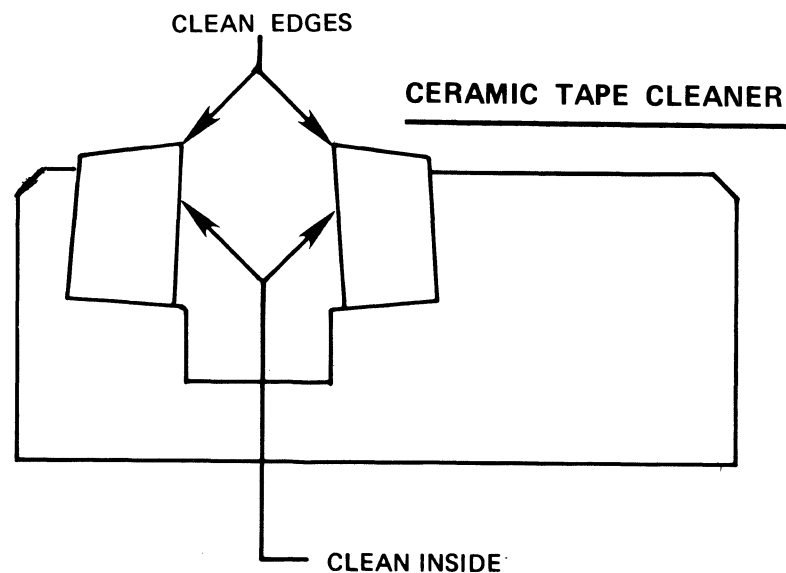
5.4 TAPE CLEANER

1. To gain access to the tape cleaner, lift off the head assembly dust cover. Remove the upper screw that secures the BOT/EOT sensor assembly to the top plate and slightly loosen the lower screw of this assembly (sensor). Slide the BOT/EOT assembly in a downward direction to gain access to the ceramic tape cleaner.
2. Slightly moisten a cotton swab with grade 38-1200 (2 - 3 microns) lapping compound, and gently clean the inside and edges of the ceramic cleaner until all traces of oxide are removed.

3. Moisten another cotton swab with head cleaner fluid or alcohol and remove all traces of the lapping compound.
4. Resecure the screws retaining the BOT/EOT sensor assembly and reinsert the head covers.

The grade 38-1200 lapping compound is available from:

United States Products Co.
518 Melwood Avenue
Pittsburg PA 15213



5.5 CAPSTAN CLEANING

CAUTION

DO NOT use alcohol, head cleaner or other solvents to clean capstan sleeve.

Clean the capstan sleeve with a lint-free, non-abrasive wipe moistened with a non-solvent degreaser such as FREON, Type TF.

5.6 HOUSING AND DUST COVER CLEANING

CAUTION

DO NOT use rough or abrasive material to clean the dust cover door as permanent scratches may result.

Clean the housing, dust cover door, and control panel with Miller-Stephenson MS 260 or equivalent commercial grade cleaner.

JUMPERS

E04 - E05 to E04 - E04 - E06 (Zone J/H-17)

E39 - E40 to E43 - E44 - E44 (Zone V-4)

CONTROLS

NOTE

Before each sequence listed below rewind tape to load point - then press appropriate switch for desired test operation.

LOAD:

Servo Test.

Tape runs forward for five seconds, then a decreasing period forward/reverse oscillation is maintained until the interval becomes zero; at which time, the tape runs forward to EOT, then reverses for five seconds. The same forward/reverse motion then repeats, terminating when the interval again becomes zero. If the arm limit remains FALSE during the test, WRT EN remains illuminated and the test cycles. If arm limit becomes TRUE during the test, the test is aborted and the RESET lamp will flash.

ON LINE:

Not used in this test sequence.

REW:

Normal rewind operation.

1600 CPI:

Phase Encoded Read/Write Test.

Flux reversals are recorded in PE mode beginning at BOT. Tape is then rewound and read forward, looking for flux reversals for a short period. If flux reversals are seen, WRT EN remains illuminated. If reversals are not detected, the test is aborted and RESET indicator will flash.

WRT EN: NRZI Read/Write Test.

Same as P.E. Test above, but in NRZI mode.

FWD: Unload Limit Test.

Tape will begin unloading if at load point. If arm limit status remains FALSE for one second, unload will cease and WRT EN will be illuminated. If arm limit becomes TRUE during the unload test, motion will cease and RESET will flash, indicating the test has failed.

RESET: Normal abort function.

Upon completion of use of the self-test feature return all jumpers to the normal position.

E43 - E44 to E39 - E40; E10 - E12 to E10 - E11.

If all tests have been successfully completed and the tape transport is operational, return to system.

7.3 OPERATIONAL TESTS

7.3.1 Preliminary

The following preliminary steps should be accomplished to establish the working condition of the tape transport.

- A. Disconnect all cables connected to the I/O PCB.
- B. Voltage Checks - with the power ON check the following voltages at the respective test points on the main electronics board.
 1. ± 20 volts = 23 to 27 volts with approximately 400 to 500 MV of ripple at 120 Hz. (Test points are located near F1 and F2 fuses.)
 2. +5 volts = +5.00 volts, adjust R66 if necessary (located at 15-C).
 3. $\pm R$ = approximately equal to each other and between 8.57 and 9.65 volts (located between 10 and 12-D).

4. ± 15 volts = 14.25 to 15.75 volts (located at 12-D).
 5. Formatter fuse (F3) = approximately +8.5 to 9.5 (for units with formatter) (located at 18-D).
- C. Servo Check - With NO TAPE on transport, press WRT EN and LOAD simultaneously. All motors (take-up, supply, capstan and retractor) should start operating.
1. The Take-Up and Supply motors will change direction as the retractor arm moves through the center position in both the upward and downward direction.
 2. The Capstan motor will turn in a CW direction as the retractor arms are moving in the upward direction and oscillate CW and CCW while the retractor arms are moving in a downward direction.
 3. Press RESET SW to end test. This test assures that the majority of the servo systems are working.
- D. Self-Test Mode - In order to conduct the operational tests it is necessary to relocate the following jumpers.
1. Move Jumper E10 - E12 to E10 - E11
 2. Move Jumper E16 - E17 to E16 - E18

7.3.2 Speed Test

- A. Install an "800 BPI Skew Tape" on the tape transport and press LOAD SW. Tape should move forward to load point (BOT) and stop.
- B. Press RESET SW. (Switch should light.) Press FWD SW. Tape should move forward at normal speed.
- C. Connect a frequency counter to TP6 (CH#7 Read) located at 14-K and monitor for frequency as follows:

SPEED	FREQUENCY
12.5 IPS	5 KHz $\pm 1\%$
18.75 IPS	7.5 KHz $\pm 1\%$
25 IPS	10 KHz $\pm 1\%$
37.5 IPS	15 KHz $\pm 1\%$
45 IPS	18 KHz $\pm 1\%$

- D. Adjust R6 (located at 12-F) if forward frequency is not per chart.
- E. Press RESET to stop forward motion of tape.
- F. Press WRT EN to move tape in the reverse direction.
- G. Frequency in reverse should be the same as in forward; if not, adjust R15 (located directly above R6) for correct frequency (See chart).

NOTE

NEVER allow SKEW TAPE to run at REWIND speed. This would shorten the usable life of the tape.

7.3.3 Alternate Speed Test (W/O Skew Tape)

- A. Thread a normal tape on the tape transport and press LOAD. Tape should move forward to load point (BOT) and stop.
- B. Press RESET switch (Switch should light). Press FWD switch, tape should move forward at normal speed.
- C. Connect a D.C. Digital Voltmeter to TP1 (Tach Output) located at 8-F and adjust R6 (Forward) and R15 (Reverse) as required to obtain values listed in chart as follows:

SPEED	VOLTAGE
12.5 IPS	± 0.37
18.75 IPS	± 0.54
25 IPS	± 0.75
37.5 IPS	± 1.12
45 IPS	± 1.30

NOTE

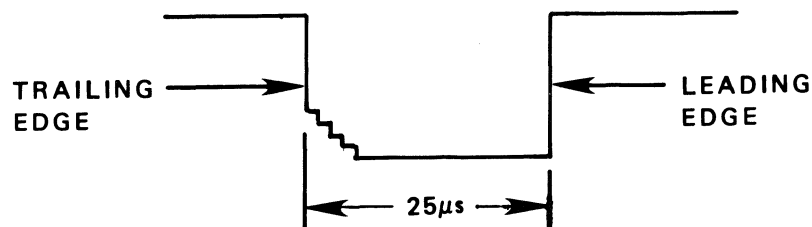
R6 = FWD (Press FWD) + Volts

R15 = REV (Press WRT EN) - Volts

This method should allow a setting near the 1% speed tolerance. However, it is recommended ONLY as an emergency measure and should be rechecked as soon as possible with an "800 BPI Skew Tape" per paragraph 7.3.2.

7.3.4 Read Gate Test (W/Skew Tape)

- Install "800 BPI Skew Tape" on drive and press LOAD switch. Tape will move forward to load point (BOT) and stop.
- Connect oscilloscope to TP52 (Skew) located at 6-P and set the scope sweep to 5 μ sec (for 18.75 or 25 IPS) or 2 μ sec (for 37.5 or 45 IPS). Set scope voltage scale for one (1) volt.
- Press FWD switch moving skew tape in a forward direction.
- Trigger scope on TRAILING EDGE of wave form.



EXAMPLE AT 25 IPS

Check that pulse width from START of TRAILING EDGE to LEADING EDGE is as follows:

SPEED	WIDTH
12.5 IPS	50 μsec
18.75 IPS	33.3 μsec
25 IPS	25 μsec
37.5 IPS	16.6 μsec
45 IPS	13.9 μsec

- E. If the "Read Gate Pulse Width" is not correct -- Adjust R498 (located at 6-L) for the correct width. If correct width cannot be attained with R498 alone, adjust R496 (located to the left of R498) in conjunction with R498 to obtain the correct width.
- F. Press RESET switch and then WRT EN switch. Skew tape should now move in the reverse direction.
- G. When tape reaches load point (BOT) it will stop. Press REWIND switch and the tape will unload.

NOTE

REMOVE THE SKEW TAPE AND DO NOT USE FOR ANY OF THE FOLLOWING TESTS.

7.3.5 Alternate Read Gate Test (W/O Skew Tape)

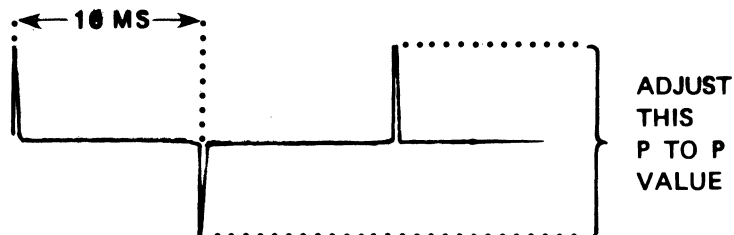
- A. Move the jumper E39-40 to E43-44. (This jumper enables the writing of data.)
- B. Install a normal test tape on the tape transport and press LOAD switch. Tape should move forward to load point (BOT) and stop. Press RESET and then FWD (tape motion will start). Press ON LINE (NRZI data will now be written on tape).
- C. Connect a scope to TP52 (Skew) located at 6-P, set scope sweep to 5 μ sec (for 18.75 or 25 IPS) or 2 μ sec (for 37.5 or 45 IPS). Set scope voltage scale for one (1) volt.
- D. Trigger scope on TRAILING EDGE of wave form (see paragraph 7.3.4 D).
- E. If the "Read Gate Pulse Width" is not correct adjust as stated in paragraph 7.3.4 E.

7.3.6 Read Level Test - NRZI

NOTE

Jumpers (E10-11 (E16-18) (E43-44) in place for this test.

- A. With a normal test tape on the tape transport at the load point (BOT), press RESET (switch lights) then press FWD (tape motion starts). Press ON LINE to generate NRZI data.
- B. Connect scope to TP6 (Read Ch #7) located at 14-K. NRZI analog READ DATA should appear at a rate of approximately one (1) pulse every 16 Msec.



- C. If required, adjust R335 (located at 12-L) for the following peak-to-peak voltages.

SPEED	VOLTS P-P		
12.5	-		
18.75	-		
25	10	volts	<u>NRZI</u>
37.5	10	volts	<u>LEVEL</u>
45	11.5 volts		

- D. Perform the above level test on each read channel (TP-6 thru TP-14), adjusting as required (R335 thru R343), for the correct read level.
- E. Check for digital output on each NRZI channel. Check TP34 thru TP42 (located at 8-K thru 8-V).

TP42	TP41	TP40	TP39	TP38	TP37	TP36	TP35	TP34
0	0	0	0	0	0	0	0	0
CH P	CH 0	CH 1	CH 2	CH 3	CH 4	CH 5	CH 6	CH 7
(8-V)								(8-K)

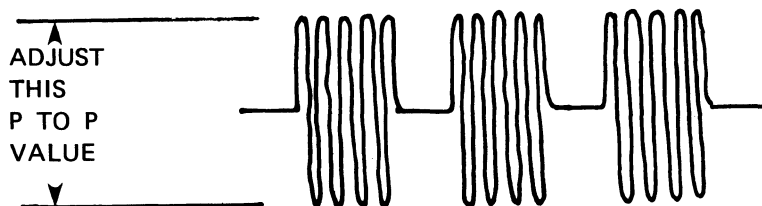
7.3.7 Read Level Test - P.E.

NOTE

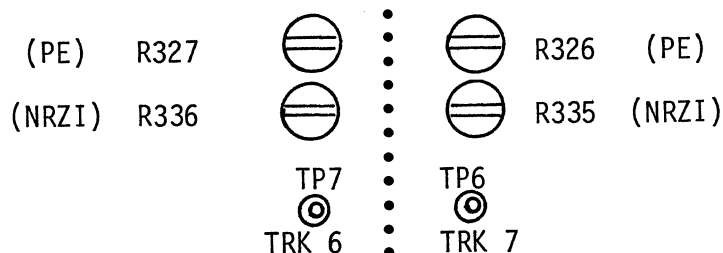
ALWAYS ADJUST NRZI LEVEL PER ABOVE PRIOR TO ADJUSTING P.E. LEVELS.

- A. When the above NRZI level adjustment is completed (paragraph 7.3.6) press the 1600 CPI switch while the tape is moving and the NRZI data will be replaced by P.E. data.

- B. Connect a scope to TP-6 - P.E. analog data should appear at a rate of one (1) BURST of data every 15 ms as follows:



- C. If required, adjust R326 (located at 11.5-L) directly above the NRZI potentiometer for that channel -



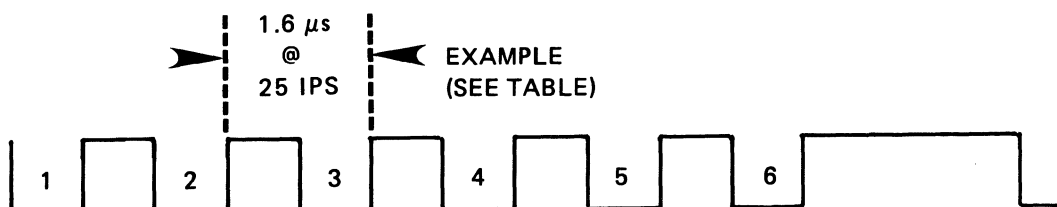
Adjust the above for the following voltage(s):

SPEED	VOLTS P-P		
12.5 IPS			
18.75 IPS			P.E.
25 IPS	14 volts		LEVEL
37.5 IPS	16.5 volts		
45 IPS	17 volts		

- D. Perform the above level test (steps B and C) on each channel (TP6 thru TP14), adjusting as required (R326 thru R337) for the correct P.E. READ level.
- E. Check for digital output on each P.E. channel by checking TP42 thru TP51 (located at 7-L thru 7-V).

7.3.8 Write Deskew Pulse Width (FWD - ON LINE - 1600 CPI)

- A. At completion of the above P.E. level test, connect a scope to the IC located at 5P (pin 8). Set scope sweep to 1 μ sec.
- B. Press FWD, ON LINE and 1600 CPI switches.
- C. A series of six (6) short pulses should appear and one (1) pulse of wider duration as shown:



- D. Check that the duration of one complete pulse, from the leading edge of one pulse to the leading edge of the next pulse is as follows:

SPEED	PULSE
12.5 IPS	2.13 μ s
18.75 IPS	1.86 μ s
25 IPS	1.6 μ s
37.5 IPS	1.07 μ s
45 IPS	.88 μ s

- E. If pulse duration is not correct, adjust R516 (located at 4V) for proper duration.

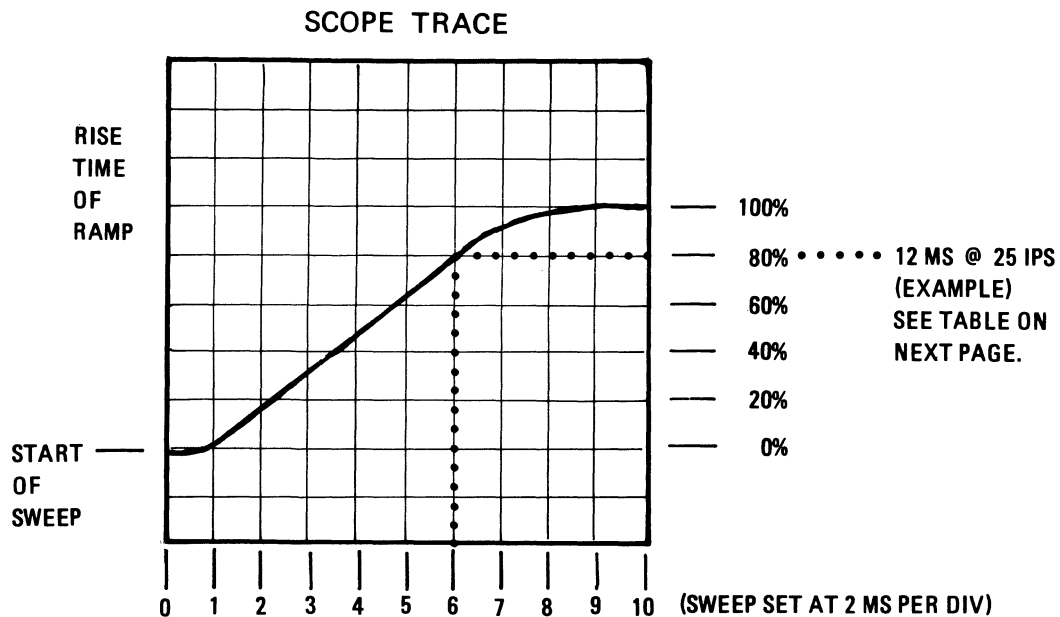
7.3.9 Ramp Test (FWD - LOAD)

A. Connect and adjust the scope as follows:

1. Vertical Input - Connect to TP1 (located at 8-F)
2. External Sync - Connect to Pin 36 of Microprocessor IC (40 pin chip located at 17-N)
3. Sweep Scale - 2 milliseC for 18.75 and 25 IPS
1 milliseC for 37.5 and 45 IPS
4. Scope Volt Scale - 0.1 volts for 18.75 and 25 IPS
0.2 volts for 37.5 and 45 IPS

B. Press FWD and LOAD switches. Tape motion on tape transport should be in a forward - stop - forward - stop sequence.

C. Adjust scope controls (Volt Variable and Position) for 100% deviation (5 major divisions). Use Position for 0% (Ground) and Volt Variable for 100% (top of trace), scope trace should appear as follows:



D. The rise time of the Ramp is measured at the 80% deviation mark (linear portion of curve) and should be as follows:

SPEED	80% of FULL RAMP
12.5 IPS	24 MS
18.75 IPS	18 MS
25	12 MS
37.5 IPS	8 MS
45 IPS	6.6 MS

- E. If RAMP rise time is not correct, adjust R22 (the bottom potentiometer located at 12-F).
- F. Switch scope trigger slope and check RAMP FALL time for the same value or slightly less (value should not be less than 1 MS from rise time).
- G. Press RESET switch to stop motion of tape. Disconnect external sync at 17-N and return scope to automatic sync. Remove scope probe from TP-1.
- H. Return the scope variable potentiometer to CALIB position and position the scope for ground at center of trace.
- I. Touch scope probe to case (collector) of the capstan driver transistor (2N6052 located at 13-A).
- J. Voltage should be zero (0) volts on the lowest scale on the scope; if not, adjust R28 (located at 10-F).
- K. Press REWIND switch to return tape to BOT, repeat to unload tape.
- L. Return all test jumpers to normal operating position.
 - 1. Move jumper E10 - 11 to E10 - 12
 - 2. Move jumper E16 - 18 to E16 - 17
 - 3. Move jumper E43 - 44 to E39 - 40

This completes the self-test operational test and adjustments. If all tests have been successfully completed and the tape transport is operational, return to system.

7.4 SENSOR CHECKS AND ADJUSTMENTS

7.4.1 Sensor Checks

A. Lamp Out

1. TP 61, Lamp out (L) is FALSE, 13H pin 5 = +2.9V
2. Disconnect J11
3. TP 61, Lamp out (L) is TRUE, 13H pin 5 = 0V
4. Connect J11

B. Retractor Motor Sensors

1. With system power ON, and no tape in path, adjust arms for 1/32 inch clearance from top stop.
2. RUP (L) is TRUE. (13F pin 1)
3. Thread tape, depress LOAD switch. Upon completion of load sequence, RDN (L) is TRUE. (13F pin 2)

C. EOT/BOT

1. With no tape in path
 - a. ETS is TRUE.
 - b. BOT is TRUE.
 - c. 13F pin 8 = $\leq +0.8V$
 - d. 13F pin 10 = $\leq +0.8V$
2. Tape without Marker in Path
 - a. ETS is FALSE (13F pin 13)
 - b. BOT is FALSE (13F pin 14)
 - c. 13F pin 8 = +4V
 - d. 13F pin 10 = +4V
3. Tape with BOT Marker in Path
 - a. ETS is FALSE (BOT is outer sensor)
 - b. BOT is TRUE (13F pin 8 = $\leq 1V$)

4. Tape with EOT Market in Path
 - a. ETS is TRUE (13F pin 10 = $\leq 1V$)
 - b. BOT is FALSE

D. Ring

1. Ring normal = 13H pin 7 = +4V (RING (L) is FALSE).
2. Ring depressed = 13H pin 7 = $\leq 0.8V$ (RING (L) is TRUE).

7.4.2 Compliance Arm Sensor Adjustments

- A. Install a normal test tape and load tape. Move tape in forward direction past BOT marker. Press RESET to stop tape.
- B. Press Power Switch to OFF (arms will drop).
- C. Turn power ON only, DO NOT PRESS LOAD.
- D. Adjust TAKE-UP COMPLIANCE CIRCUIT as follows:
 1. Connect DVM to J6 pin 2. Connect ground of DVM to COMMON TP.
 2. Check the two screws that attach sensor plastic block to metal container to insure tightness.
 3. Manually move take-up arm from the lower position, which must be a NEGATIVE voltage of approximately -4.5 to -6.0 VDC on DVM, to the first reference mark which is approximately 3/8 inch from the lower resting position. (There are a total of three (3) reference marks on the frame; lower, center and upper.) Note this negative voltage (-5 volts).
 4. Continue to move the take-up arm upward to the upper reference mark (1 - 1/2 inches from the top) and note the positive voltage on the DVM (+5 volts).
 5. The voltage readings taken in steps 3 and 4 should be of equal amplitude, but opposite polarity.
 6. If the above readings are not equal to within ± 0.5 volt, gently adjust the shutter by hand until this tolerance is met.

7. Upon completion of the prior step, move the arm until the DVM indicates zero (0) volts. At this voltage the arm should be within $\frac{3}{8}$ of an inch from the center reference mark.
8. Should the prior step not fall within tolerance, let the arm go to the lowest position. Loosen the two screws that attach the plastic sensor housing to the metal casting and gently shift the plastic slightly. Retighten the two screws and repeat steps 3 thru 7. Ideally, the lower and upper reference marks will be approximately -5V and +5V respectively and the center reference mark will be zero (0) volts (within $\frac{3}{8}$ of an inch of the mark).
9. Install metal cover over compliance housing and recheck references. Voltages may be slightly higher, but still within tolerance.

E. Supply Compliance Circuit

1. Connect DVM to J7 pin 2. Connect ground of DVM to common TP.
2. Perform steps 2 thru 9 above. All readings and tolerances should be the same.

7.4.3 Arm Limit Adjustments

A. TAKE-UP ARM Limit Adjustments.

1. Manually lock SUPPLY ARM in the upward position at least two (2) inches into the upward travel.
2. Connect scope to TP60 (set scope at 2 volts per division).
3. With TAKE-UP ARM on the lower rest, scope should indicate 0 volts, if not, adjust R85 (on take-up servo) in the CW direction.
4. Gently move TAKE-UP ARM until the bottom portion of arm metal is in-line with LOWER reference mark. Scope should switch to +5 volts, if not, adjust R85 in a CCW direction until voltage just does switch to +5 volts.

5. Continue moving TAKE-UP ARM toward UPPER reference mark while monitoring scope. Voltage should stay at +5 volts level until center of take-up arm is in line with UPPER reference mark, at this time voltage should switch to 0 volts once again.
6. Should voltage switch to 0 volts prior to arm in line with UPPER reference mark, turn R77 slightly in a CW direction and restart procedure at step 4 above. Recheck R85 adjustment with LOWER reference mark.
7. When adjustment is correct between reference marks, ascertain that when the arm is extended above the UPPER reference mark the scope voltage remains at 0 volts, while the arm travels to the upper most physical position.

B. SUPPLY ARM Limit Adjustments

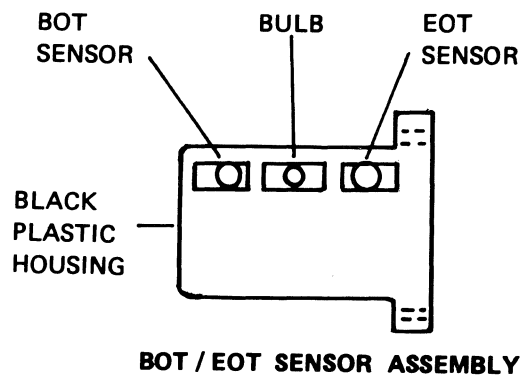
1. Manually lock TAKE-UP ARM in upward position at least two (2) inches in the upward travel.
2. Connect scope to TP60 (set at 2 volts per division).
3. With SUPPLY arm on the lower rest, scope should indicate 0 volts, if not, adjust R105 (on supply servo) toward CW direction.
4. Gently move SUPPLY ARM until bottom portion of arm metal is in line with LOWER reference mark. Scope at this instance should switch to +5 volts, if not adjust R105 in a CCW direction until voltage just does switch to +5 volts.
5. Continue moving SUPPLY ARM toward UPPER reference mark while monitoring scope. Voltage should remain at +5 volt level until center of supply arm is in line with UPPER reference mark; at which time voltage should switch to 0 volts once again,
6. Should voltage switch to 0 volts prior to arm in line with UPPER reference mark, adjust R97 slightly in a CW direction and restart this procedure at step 4 above. Recheck R105 adjustments with LOWER reference mark.

7. When adjustment is correct between reference marks, ascertain that when the arm is extended above the UPPER reference mark the scope voltage reading remains at 0 volts while the arm travels to the upper most physical position.

7.4.4 BOT/EOT Sensor Adjustment

- A. With tape removed from the transport, turn on power.
- B. Connect a scope to P10 Pin 2 on solder side of the Main Electronics P.C.B. (not the sensor P.C.B.). (P10 connector is mounted at location 16-F).
- C. Voltage at this time should be +0.5 volts or less. (This is checking the output of the BOT sensor as the light is reflected off a metal strip mounted on the top of the tape cleaner.) If voltage is greater than +0.5 volts then remove head cover on right side and push the BOT sensor to its extreme center position (sensor pointed into transport) voltage should be in tolerance.
- D. Move scope to P10 Pin 5 (EOT sensor output). Voltage should again be +0.5 volts or less. If not, remove upper screw that holds the plastic housing and loosen lower screw. Tilt the housing and push EOT sensor toward center (away from transport). Resecure housing and head cover, voltage should be in tolerance.
- E. Thread a tape on transport (do not load). Voltage at P10 Pin 2 and 5 should be greater than +3.5 volts. If not, move sensors away from center. Recheck voltage again with no tape in path for 0.5 volts or less.
- F. When above conditions are met, and load switch is depressed, tape should run to "Load Point" (load light on) and then stop while awaiting further instructions.
- G. Voltage on P10 Pin 2 at load point should be less than +0.5 volts (BOT) while the voltage on P10 Pin 5 should be greater than +3.5 volts (EOT).

- H. By adding a metal strip to your tape at the EOT position a few feet in the Forward direction, the tape can quickly be cycled from BOT to EOT (at EOT Pin 5 will be less than +0.5 volts and BOT will be greater than +3.5 volts at Pin 2) to verify correct system operation.



- I. If sensors are not adjusted correctly, tape will not load correctly.

SECTION VIII

TROUBLESHOOTING

8.1 INTRODUCTION

This section contains instructions for determining the cause of the more common tape transport malfunctions. If a malfunction occurs which cannot be isolated with these instructions, use standard troubleshooting procedures in conjunction with the built-in diagnostic test program.

NOTE

Before performing any troubleshooting, check to see that the equipment is connected properly and that all associated equipment is in good operating condition.

In order to locate a malfunction, the troubleshooter should establish a logical approach to the problem. It is important that he follows instructions and understands the theory of operation and built-in diagnostic test program.

One of the first approaches to locating the malfunction should be to visually inspect the unit for damaged components. Many times mechanical malfunctions can be isolated by listening for unusual noises while the transport is operating. When a defective component is located, identify it by referring to Section IX to get the part number and/or its value. If a replacement part is available, substitute it for the suspected defective part.

NOTE

If replacement of the defective component requires major alignment, it is recommended that the unit be returned to TDI for factory repair and adjustment.

8.2 COMMON PROBLEMS

Table 8.1 lists the common problems associated with tape transport operation, together with the probable cause and remedy.

8.3 SYSTEM TROUBLESHOOTING

Table 8.2, used in conjunction with the schematic diagrams in Section IX provides an aid to the isolation and repair of faults.

8.4 TROUBLESHOOTING WITH OFF-LINE DIAGNOSTIC TESTS

The TDI 1050 troubleshooting philosophy is one of isolation and repair. The troubleshooting chart in Table 8.3 will help identify the more complex problems. When used in conjunction with the off-line diagnostic tests, isolation of the failure should be possible in most cases to single component or circuit. Table 8.3 has been developed to show the common failures in order of frequency of occurrence.

8.5 TEST POINT CHARTS

Table 8.4 contains a listing of the TDI 1050 test points, board location and signal descriptions.

8.6 CIRCUIT BOARD ADJUSTMENTS

Table 8.5 contains a listing of the main electronic board adjustment points.

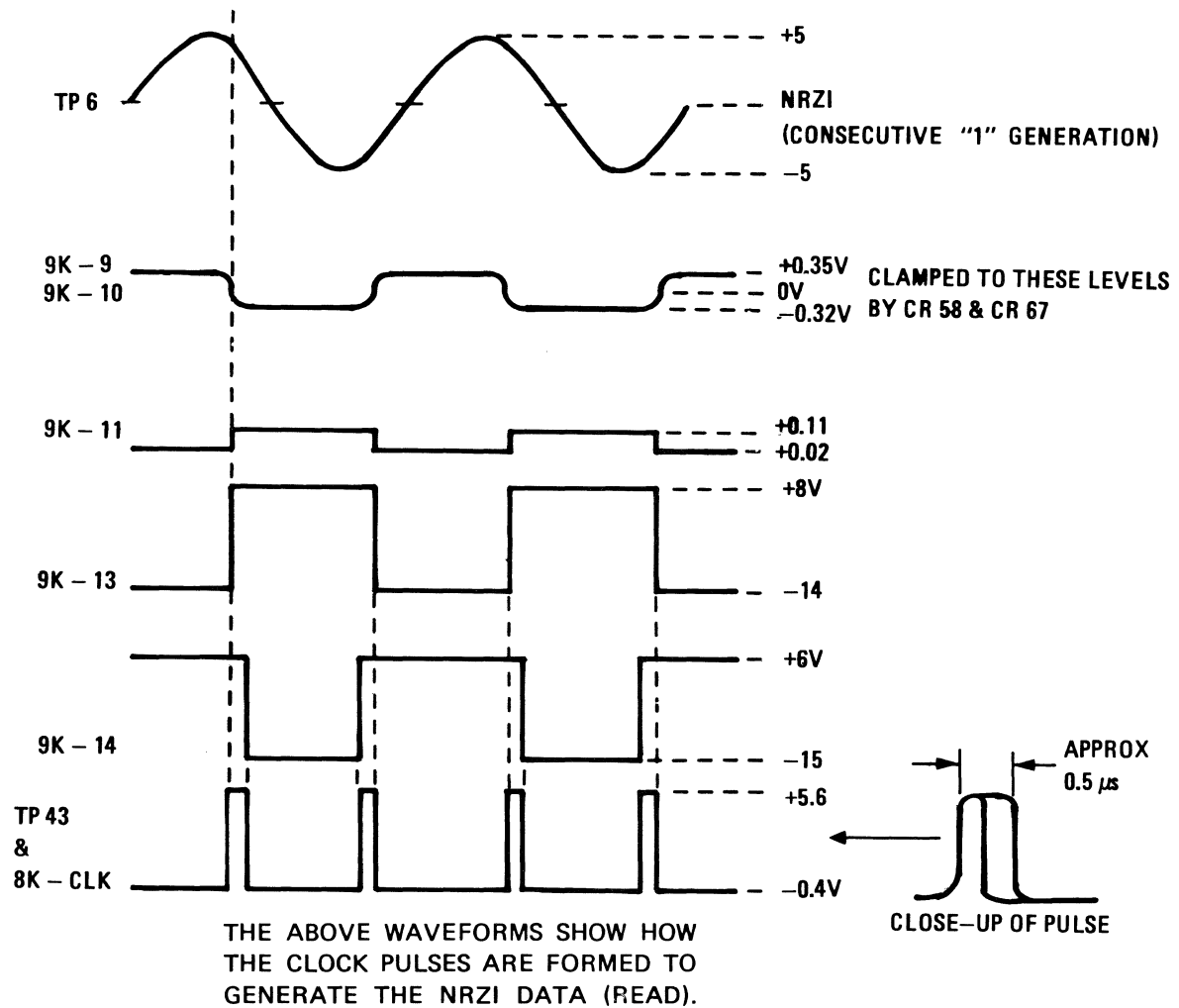
8.7 DATA GENERATION PATTERNS

Figures 8-1 thru 8-5 provide data generation information for NRZI and P.E. data.

TABLE 8.5. TDI 1050 CIRCUIT BOARD ADJUSTMENTS (CONTINUED)

ADJUSTMENT	DESCRIPTION	CIRCUIT
R97	Voltage Divider +R/-R	
R105	Supply Servo Adjustment	
R326/ R334	Read Channel Adjustment	
R335/ R343	Read Channel Adjustment	
R496	HI DENSITY ADJUSTMENT	
R498	LO DENSITY ADJUSTMENT	
R516	Frequency Adjustment Vco Write Control	

CLOCK GENERATION NRZI @ 800 BPI



RELATIVE VOLTAGES

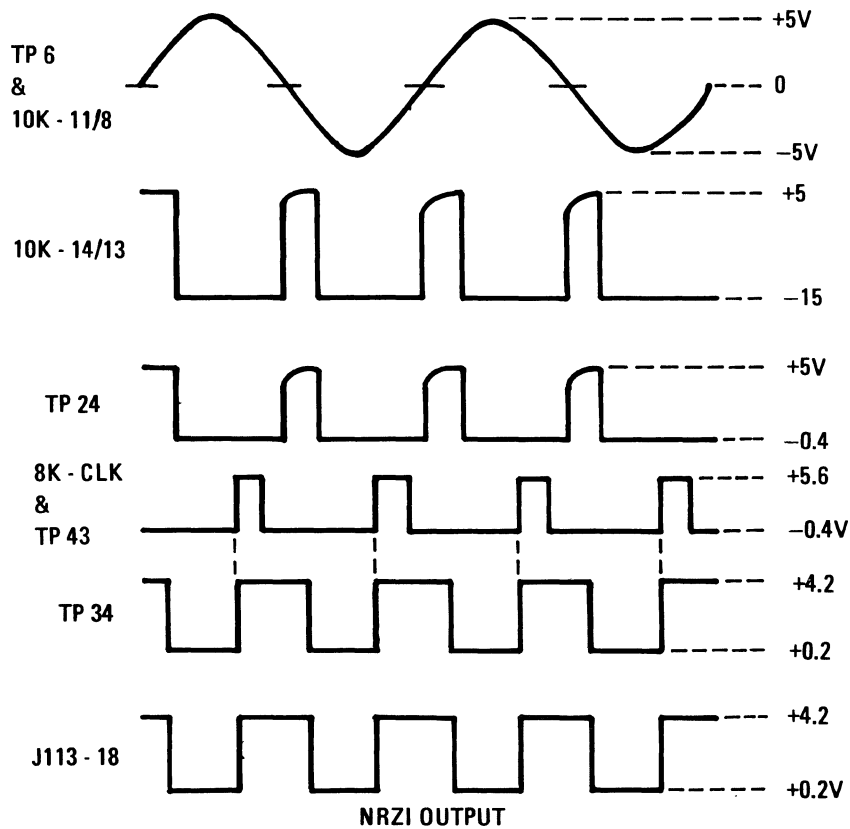
- 1 PEMOA = +4.9V (NRZI)
- 2 PEMO = LOW (+0.08V)
- 3 CR 58 = +0.35 (ANODE OF CLAMPING DIODE)
- 4 CR 67 = -0.32 (CATHODE OF CLAMPING DIODE)

THRESHOLD VOLTAGES (NRZI)

	+T	-T	
HIGH	+1.6	-1.6	= (READ AFTER WRITE)
MET	+0.8	-0.8	= (READ ONLY)
LOT	+0.4	-0.4	= (AVAILABLE)

Figure 8-1. Clock Generation NRZI @ 800 BPI

DATA GENERATION NRZI 800 BPI



ABOVE WAVEFORMS SHOW HOW THE
NRZI READ OUTPUT DATA IS GENERATED

OTHER NRZI WAVEFORMS

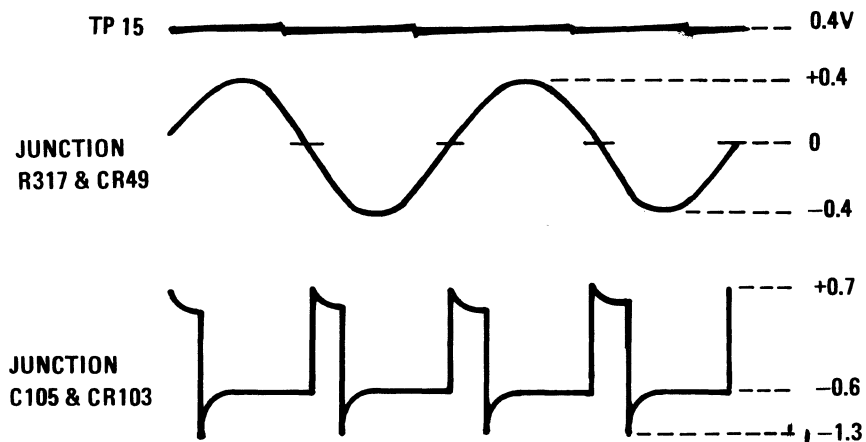


Figure 8-2. Data Generation NRZI @ 800 BPI

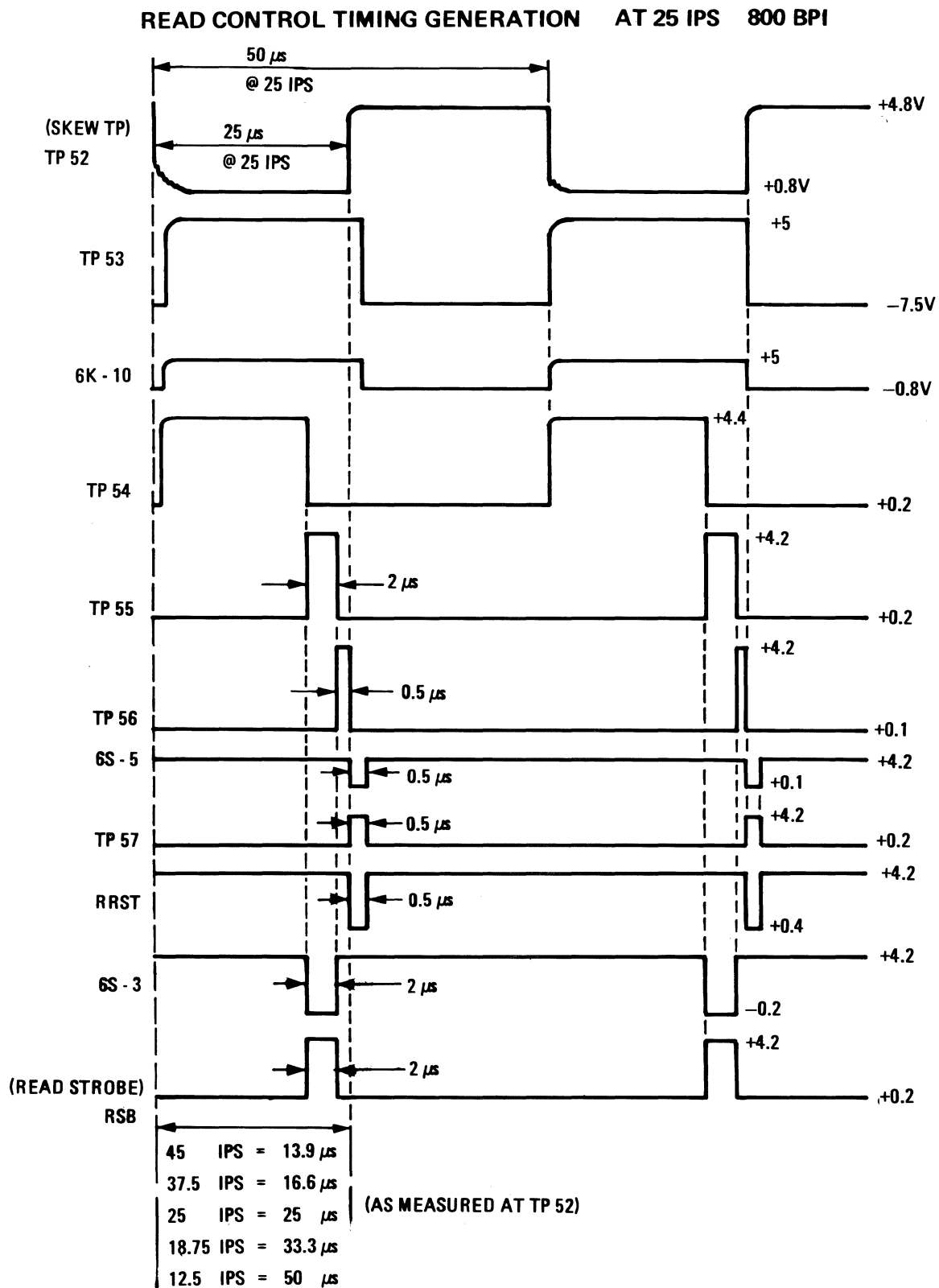
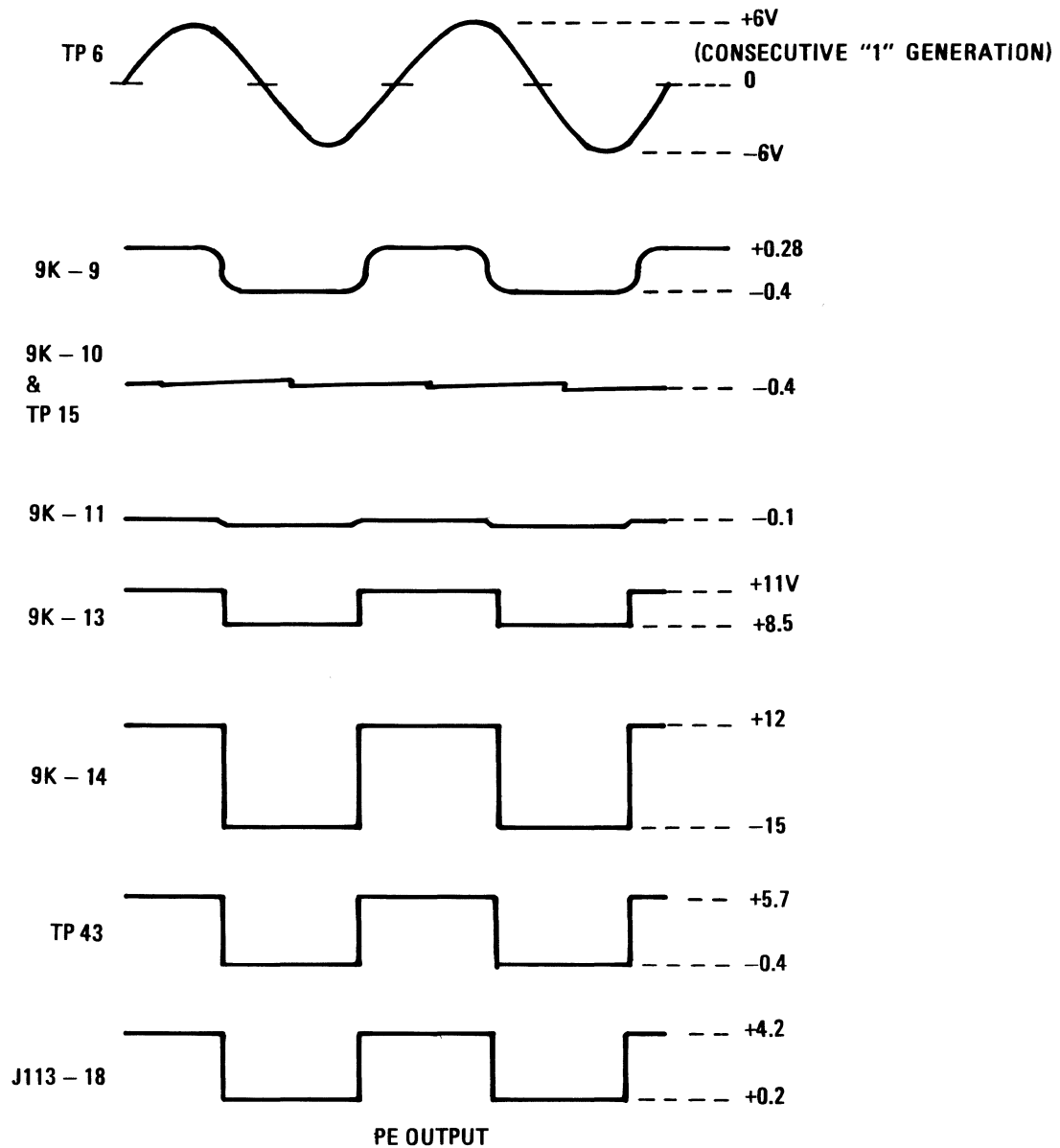


Figure 8-3. Read Control Timing Generation at 25 IPS 800BPI

DATA GENERATION P.E.



ABOVE WAVEFORMS SHOW HOW THE
P.E. READ OUTPUT DATA IS GENERATED

RELATIVE VOLTAGES

- 1 PEMOA = -12 VOLTS (P.E.)
- 2 PEMO = HIGH (+4.08)
- 3 CR 58 = +0.30 (ANODE)
- 4 CR 67 = -0.40 (CATHODE)

THRESHOLD VOLTAGES

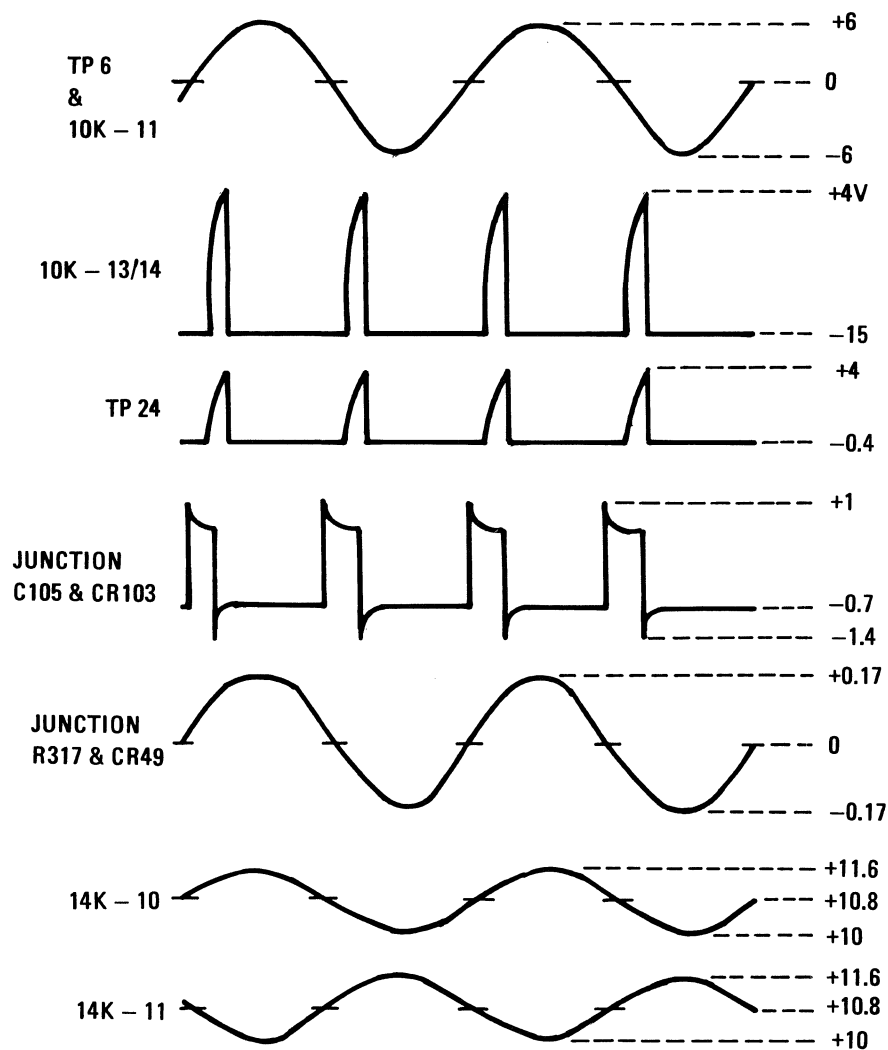
	+T	-T
HIT	+1.3	-1.3 (READ AFTER WRITE)
MET	+0.5	-0.5 (READ ONLY)
LOT	+0.3	-0.3 (AVAILABLE)

AFTER 11/1/78

1.0 VOLTS
0.3
0.25

Figure 8-4. Data Generation P.E.

P.E. READ GENERATION



ABOVE WAVEFORMS ARE ASSOCIATED
WITH P.E. READ GENERATION

Figure 8-5. P.E. Read Generation

SECTION IX

DIAGRAMS

9.1 INTRODUCTION

This section contains the logic, schematic and assembly diagrams necessary for maintenance and/or troubleshooting the tape transport.

9.2 LOGIC SYMBOLS

Table 9.1 shows the logic symbols, including truth tables, for the IC's used in the TDI 1050 Series. Table 9.2 and 9.3 show the logic symbols and truth tables for the D-Type and JK flipflops respectively.

TABLE 9.1. LOGIC SYMBOLOGY AND TRUTH TABLES

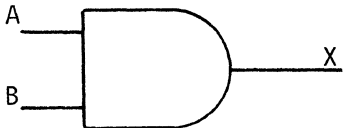
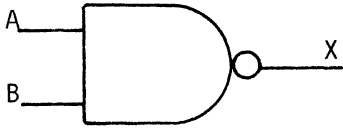
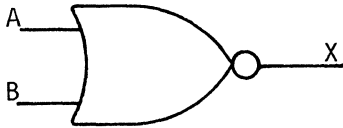
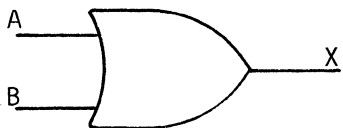
TYPE	SYMBOL	A	B	X
AND		H H L L	H L H L	H L L L
NAND		H H L L	H L H L	L H H H
NOR		H H L L	H L H L	L L L H
OR		H H L L	H L H L	H H H L

TABLE 9.2. D-TYPE FLIPFLOP

74 DUAL D-TYPE POSITIVE-EDGE-TRIGGERED FLIP-FLOPS WITH PRESET AND CLEAR

FUNCTION TABLE					INPUTS		OUTPUTS	
PRESET	CLEAR	CLOCK	D		Q	$\bar{Q}$		
L	H	X	X	H	L			
H	L	X	X	L	H			
L	L	X	X	H*	H*			
H	H	↑	H	H	L			
H	H	↑	L	L	H			
H	H	L	X	Q_0	$\bar{Q}_0$			

74LS74

H = high level (steady state), L = low level (steady state), X = irrelevant
 ⌋ = high-level pulse; data inputs should be held constant while clock is high; data is transferred to output on the falling edge of the pulse.
 ↑ = transition from low to high level, ↓ = transition from high to low level
 Q_0 = the level of Q before the indicated input conditions were established.
 TOGGLE: Each output changes to the complement of its previous level on each active transition (pulse) of the clock.
 *This configuration is nonstable; that is, it will not persist when preset and clear inputs return to their inactive (high) level.

TABLE 9.3. JK FLIPFLOP

109 DUAL J-K POSITIVE-EDGE-TRIGGERED FLIP-FLOPS WITH PRESET AND CLEAR

FUNCTION TABLE							INPUTS		OUTPUTS	
PRESET	CLEAR	CLOCK	J	$\bar{K}$		Q	$\bar{Q}$			
L	H	X	X	X	H	L				
H	L	X	X	X	L	H				
L	L	X	X	X	H*	H*				
H	H	↑	L	L	L	H				
H	H	↑	H	L	TOGGLE					
H	H	↑	L	H	Q_0	$\bar{Q}_0$				
H	H	↑	H	H	H	L				
H	H	L	X	X	Q_0	$\bar{Q}_0$				

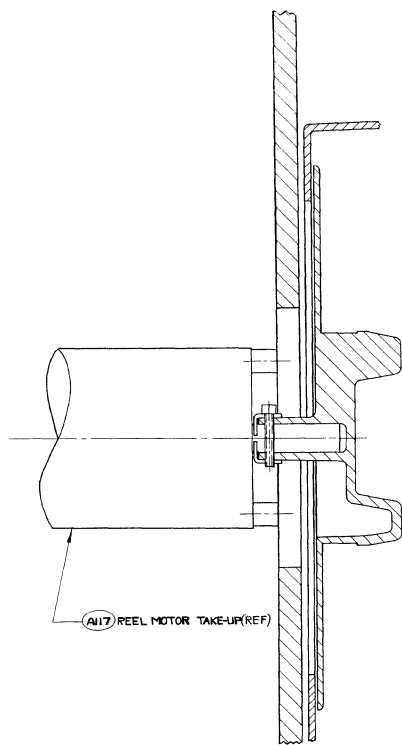
74LS109

H = high level (steady state), L = low level (steady state), X = irrelevant, ↑ = transition from low to high level
 ⌋ = high-level pulse; while the clock is high, changes at the J and K inputs after the specified hold time have no effect. Data is transferred to output on the falling edge of the pulse.
 Q_0 = the level of Q before the indicated input conditions were established.
 TOGGLE: Each output changes to the complement of its previous level on each active transition (pulse) of the clock.
 *This configuration is nonstable; that is, it will not persist when preset and clear inputs return to their inactive (high) level.

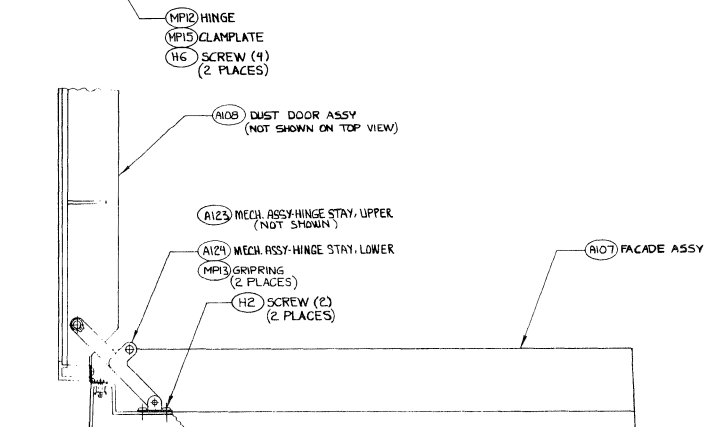
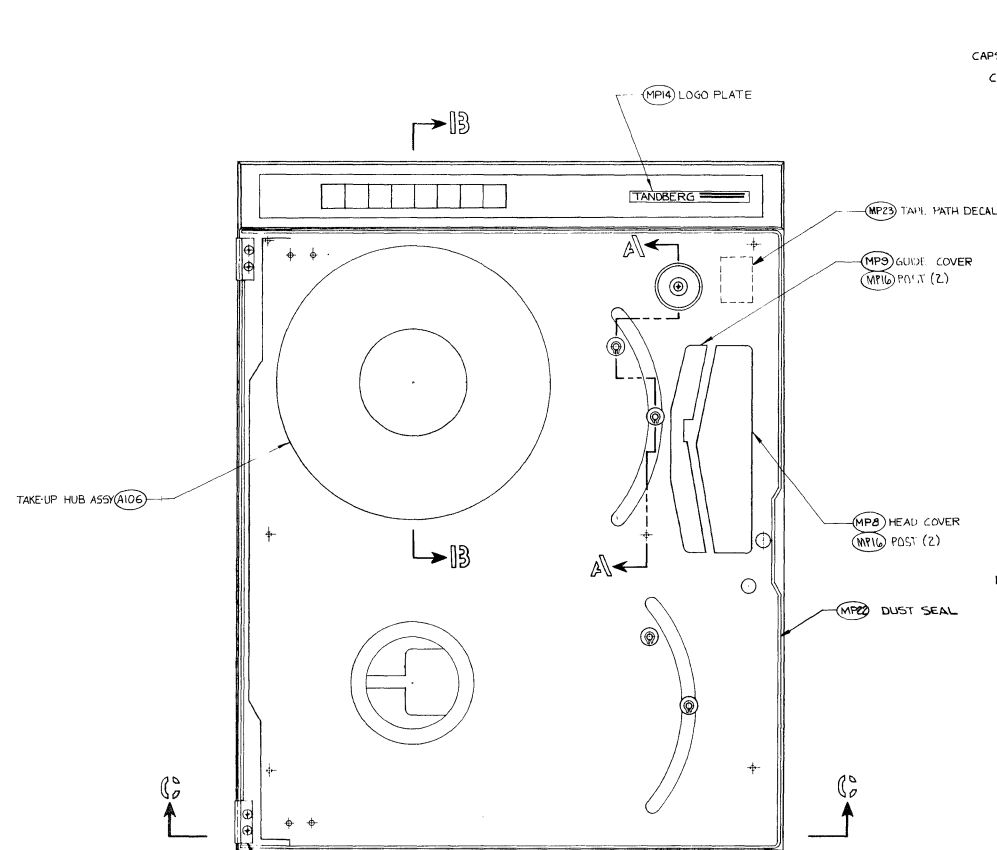
9.3 LISTING

The Engineering drawings contained herein are listed below in the order of their appearance.

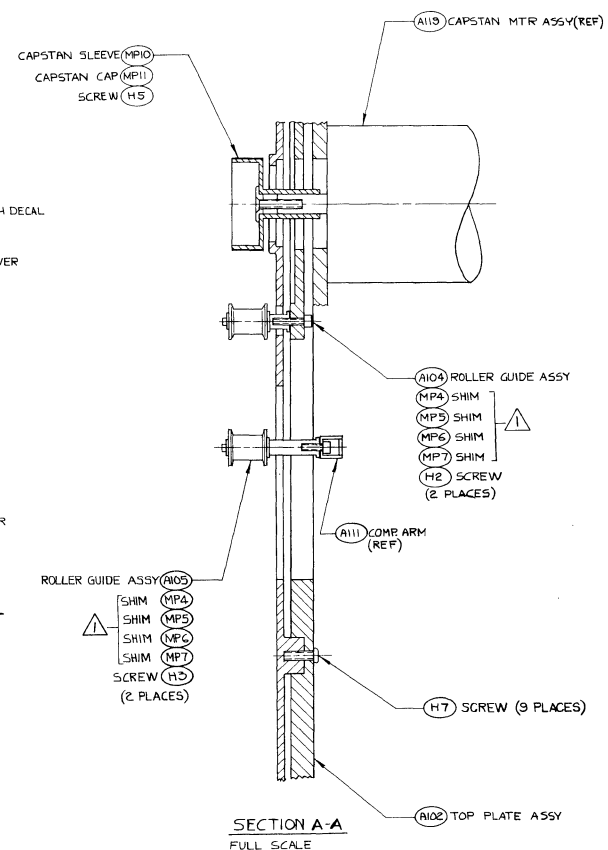
DRAWING NO.	TITLE	NO. OF PAGES
10-00045	FINAL ASSY - Model 1051 Drive, Standalone, Syn. Tape Transport	1
00-300045	BLOCK DIAGRAM - Digital Tape Recorder	3
11-00075	PCB ASSY - Main Electronics	1
01-30075	SCHEMATIC - Main Electronics	5
11-00003	I/O INTERFACE - Mod. 1051 - Industry Std.	1
01-30003	SCHEMATIC - I/O Interface, Industry Std.	1
00-90008	CABLE INSTALLATION/ROUTING	1
11-10030	MECH ASSY - Roller Guide, Top Plate	1
11-10031	MECH ASSY - Roller Guide, Compliance Arm	1
11-10040	MECH ASSY - Compliance Arm	1
11-10041	MECH ASSY - Headplate	1
00-90005	Main PCB Removal	1
00-90006	Power Supply Removal	1



SECTION B-B
FULL SCALE



SECTION C-C



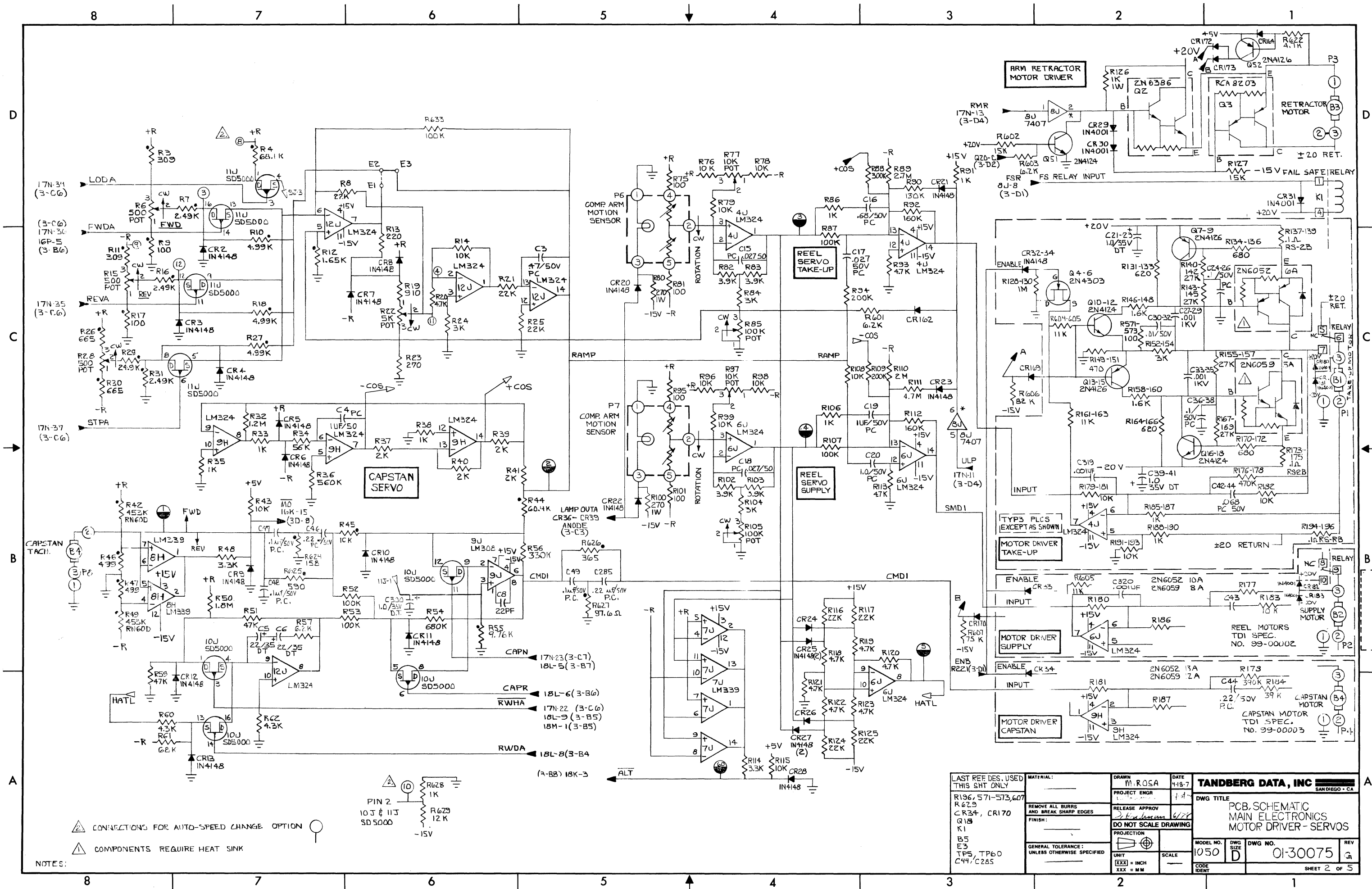
SECTION A-A
FULL SCALE

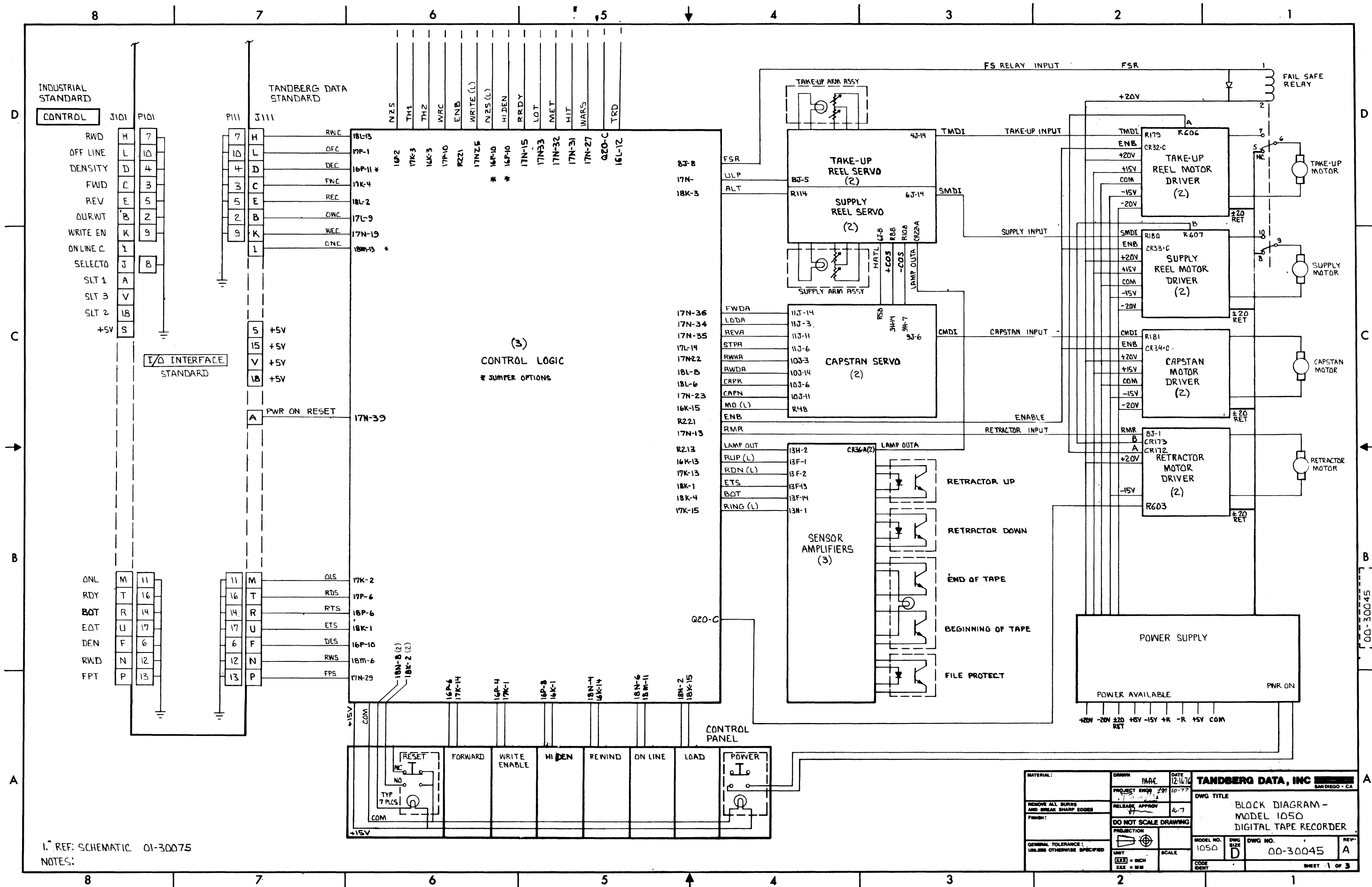
USE SHIMS AS REQUIRED FOR PROPER ROLLER GUIDE HEIGHT.
NOTES:

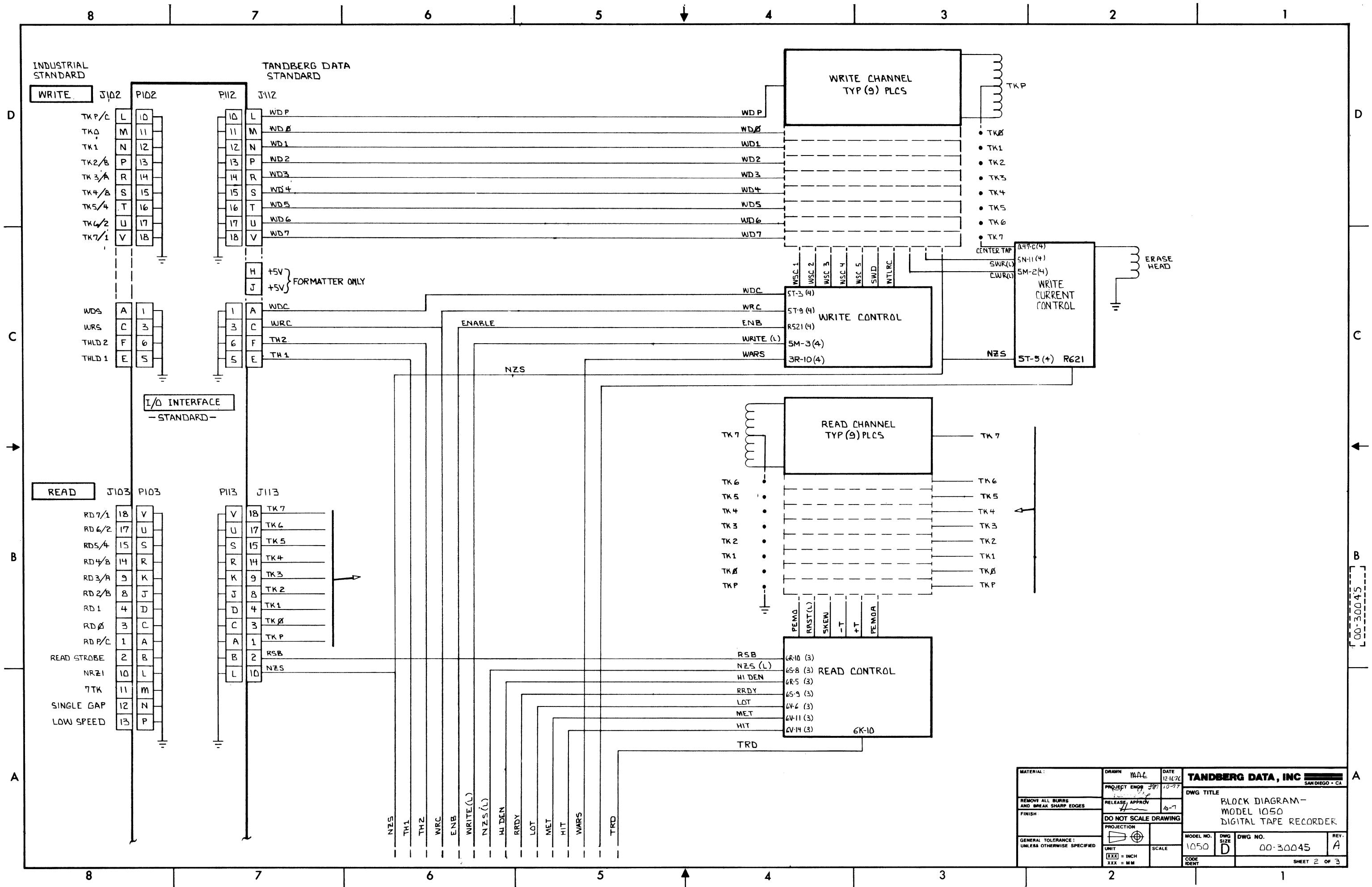
C	ECN 1266	LF	LF 274
B	ECN 1221, 1205, 1251	LF	LF 274
A	DCN 1016, ECN 1025	LF	LF 274
LTR	DESCRIPTION	DWG	APP

MATERIALS:	DRAWN M. ROSE	DATE 4-21-71	TANDBERG DATA, INC. SAN DIEGO, CA
REMOVE ALL BURRS AND BREAK SHARP EDGES	PROJECT ENG. 277 VSC	PROJ. 277	DWG TITLE FINAL ASSY - STD SYNCHRONOUS TAPE TRANSPORT
FINISH:	DO NOT SCALE DRAWING	PROJECTION 1:1	MODEL NO. 1050
GENERAL TOLERANCE UNLESS OTHERWISE SPECIFIED	UNIT DIM - INCH XXX - MM	SCALE 1:1 1:2	DWG NO. 10-00045
			REV C

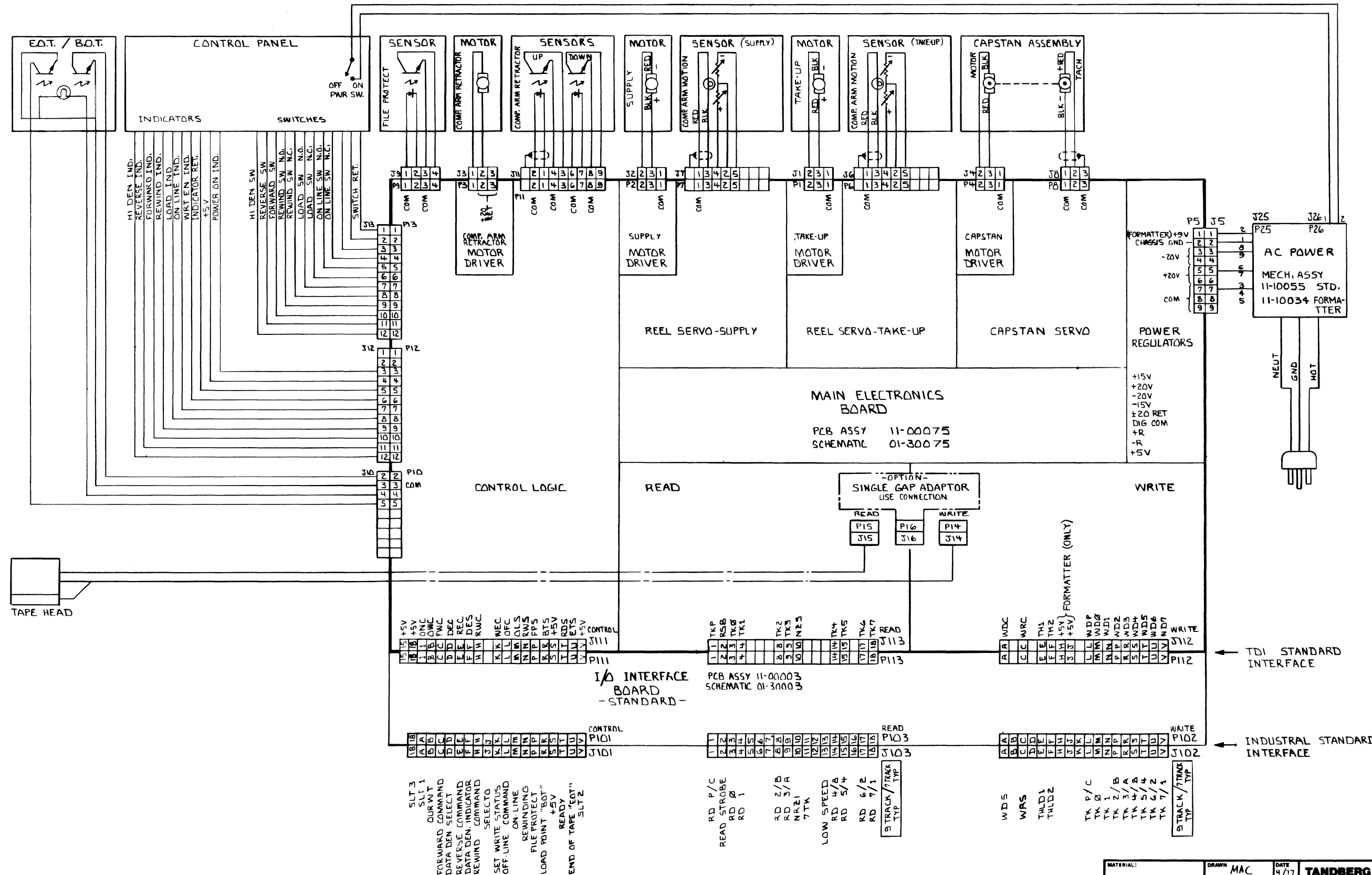
A100



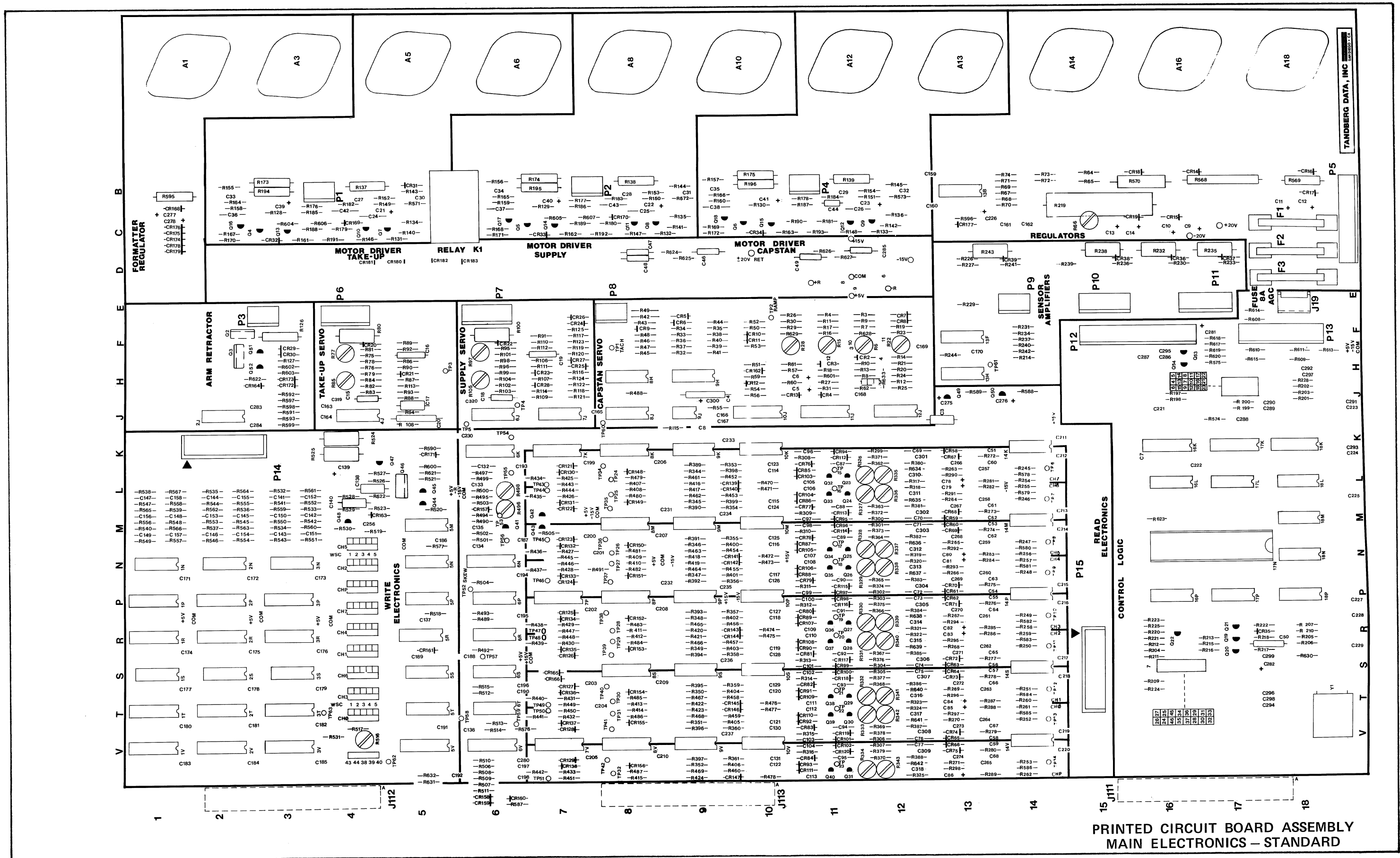


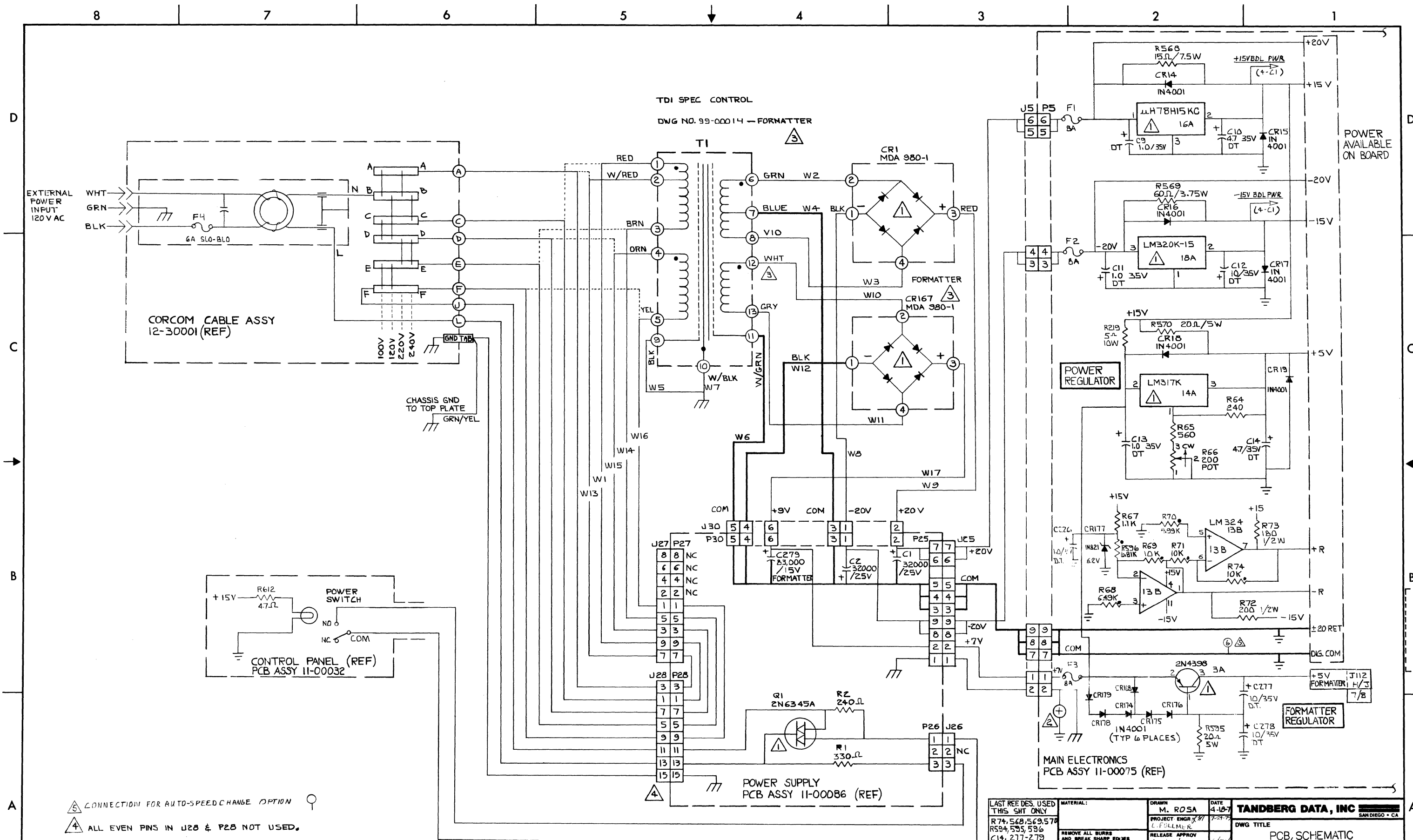


MATERIAL:		DRAWN: MAE	DATE: 12-16-76	TANBERG DATA, INC.	
PROJECT ENGR: JPM		RELEASE: APPROV: JPM	DATE: 12-17-76	SAN DIEGO, CA	
REMOVE ALL BURRS AND BREAK SHARP EDGES		DO NOT SCALE DRAWING		DWG TITLE	
FINISH:		PROJECTION		BLOCK DIAGRAM - MODEL 1050	
GENERAL TOLERANCE: UNLESS OTHERWISE SPECIFIED		UNIT: [XXX] = INCH, [XXX] = MM		DIGITAL TAPE RECORDER	
SCALE: 1050		DWG NO. 00-30045		MODEL NO. 1050	REV. A
CODE IDENT		SHEET 2 OF 3			



MATERIAL:		DRAWN: MAC		DATE: 4/77	
PROJECT: EMBR 207		PROJECT: EMBR 207		DATE: 4/77	
RELEASE: APPROV		RELEASE: APPROV		DATE: 4/77	
FINISH:		DO NOT SCALE DRAWING		PROJECTION	
GENERAL TOLERANCE: UNLESS OTHERWISE SPECIFIED		UNIT: XXX = INCH XXX = MM		SCALE	
TANDBERG DATA, INC. SAN DIEGO, CA		DWG TITLE: BLOCK DIAGRAM DIGITAL TAPE RECORDER		MODEL NO. TD11050	
DWG NO. 00-30045		REV A		SHEET 3 OF 3	





NOTES:

1. CONNECTION FOR AUTO-SPEEDCHANGE OPTION

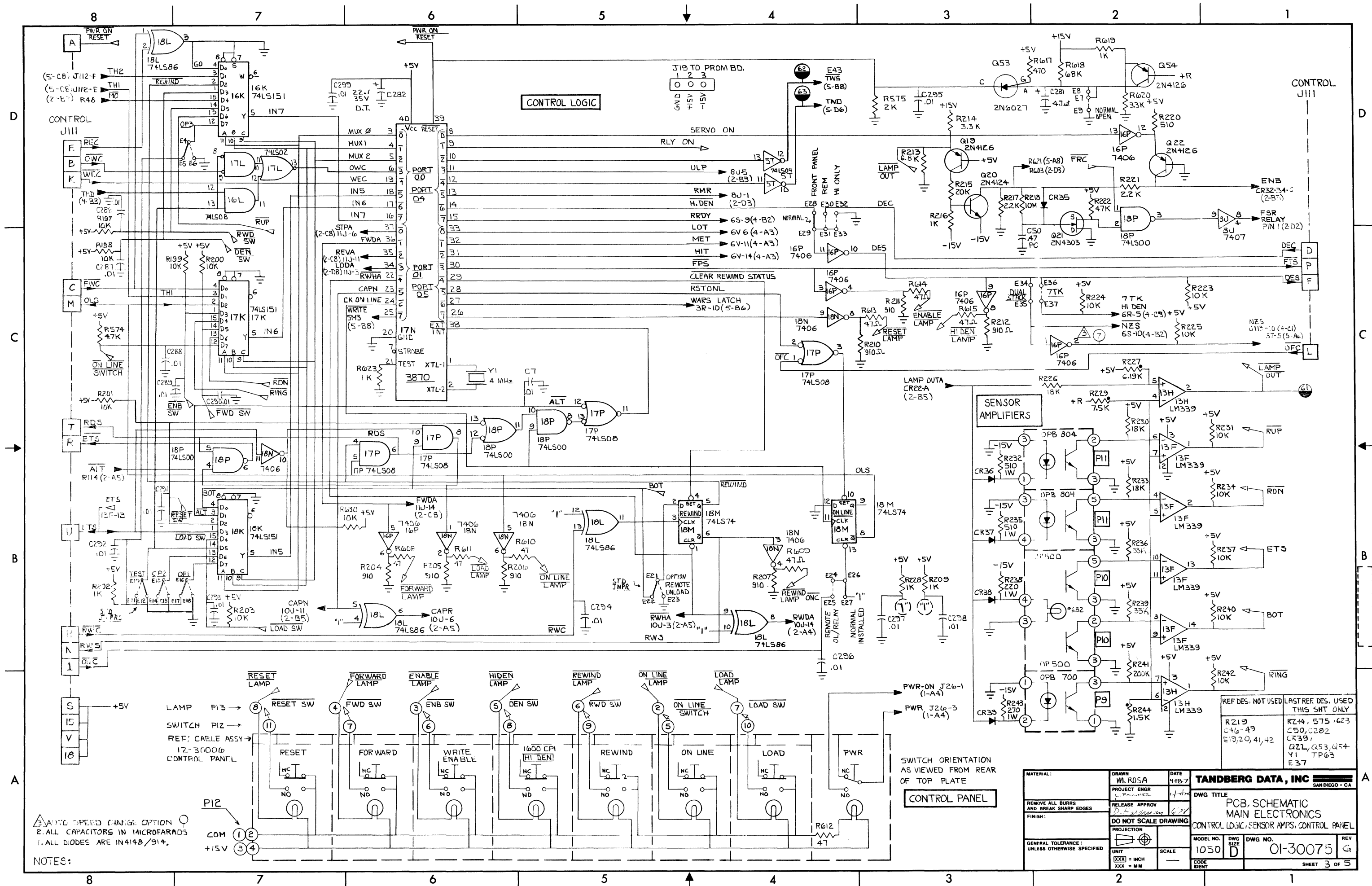
2. ALL EVEN PINS IN J28 & J29 NOT USED.

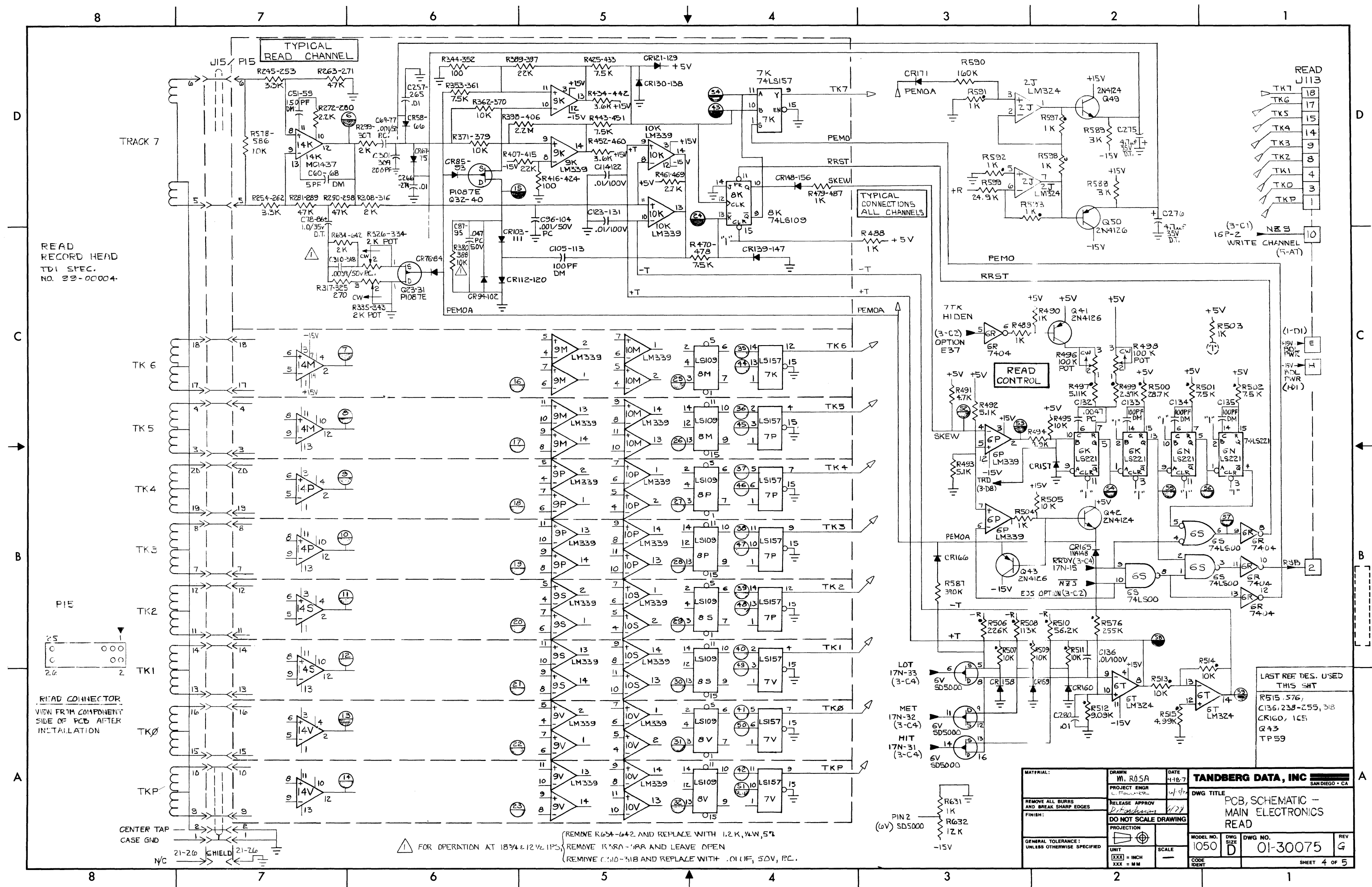
3. LOGIC GROUND TO CHASSIS GND OPTIONAL. ADD SCREW ON MAIN ELECTRONICS PCB-ASSY 10-00075.

4. COMPONENT REQUIRES HEATSINK.

REV	DESCRIPTION	DWG	APP	LTR	DESCRIPTION	DWG	APP	LTR	DESCRIPTION	DWG	APP	LTR
G	ECN 1203				1257, 1237, 1245				1076, 1077, 1078, 1093			
F	ECN 1208, 1207				1234, 1235, 1236				1095, 1062, 1063, 1072			
E	ECN 1248, 1265				1162, 1125, 1129				1075, 1032, 1041, 1044			
D	ECN 1159, 1219				1153, 1219				ECN 1045, 1046, 1053			
C									ECN 1000, 1001, 1033, 1042			
B												
A												

LAST REF DES. USED THIS SHIT ONLY		MATERIAL:		DRAWN: M. ROSA		DATE: 4-10-77		TANDBERG DATA, INC	
PROJECT ENGR: R74, 568, 569, 570		REMOVE ALL BURNS AND BREAK SHARP EDGES		RELEASE APPROV: [Signature]		DO NOT SCALE DRAWING		DWG TITLE: PCB, SCHEMATIC MAIN ELECTRONICS POWER SUPPLY-REGULATORS	
R594, 595, 596		FINISH:		GENERAL TOLERANCE: UNLESS OTHERWISE SPECIFIED		UNIT: [X] = INCH [X] = MM		MODEL NO. 1050	
C14, 217-279		PROJECTION: [Symbol]		SCALE: [Symbol]		DWG NO. 01-30075		REV G	
CR19, 167, 168, CR19		CODE IDENT		SHEET 1 OF 5					





READ
RECORD HEAD
TDI SPEC.
NO. 23-00004

READ CONNECTOR
VIEW FROM COMPONENT
SIDE OF PCB AFTER
INSTALLATION

TYPICAL
READ CHANNEL

TYPICAL CONNECTIONS
ALL CHANNELS

READ
CONTROL

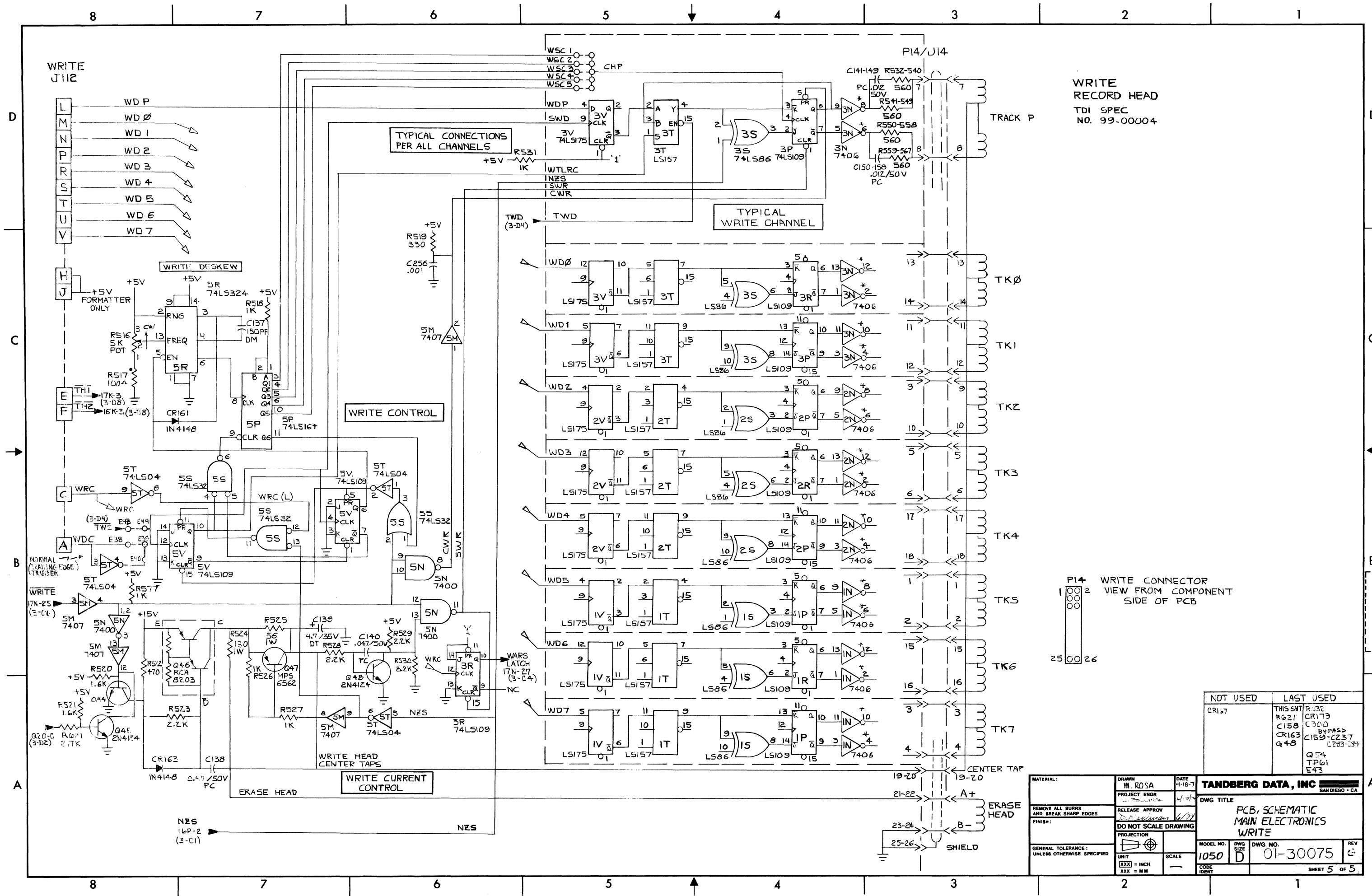
READ
J113

(3-C1)
16P-2
WRITE CHANNEL
(5-A1)

(1-D1)
16P-2
WRITE CHANNEL
(4-B1)

LAST REF DES. USED
THIS SHIT
R515, 576,
C136, 238-255, 318
CR160, 165
Q43
TP59

MATERIAL:		DRAWN M. ROSA	DATE 4-18-77	TANDBERG DATA, INC	
PROJECT ENGR L. FOLLETT		DWG TITLE PCB, SCHEMATIC - MAIN ELECTRONICS READ		SAN DIEGO - CA	
RELEASE APPROV D. FOLLETT		DO NOT SCALE DRAWING		REV 4	
PROJECTION FIRST ANGLE		UNIT XXX = INCH XXX = MM		SCALE 1:1	
GENERAL TOLERANCE: UNLESS OTHERWISE SPECIFIED		MODEL NO. 1050		DWG NO. 01-30075	
		SHEET 4 OF 5			

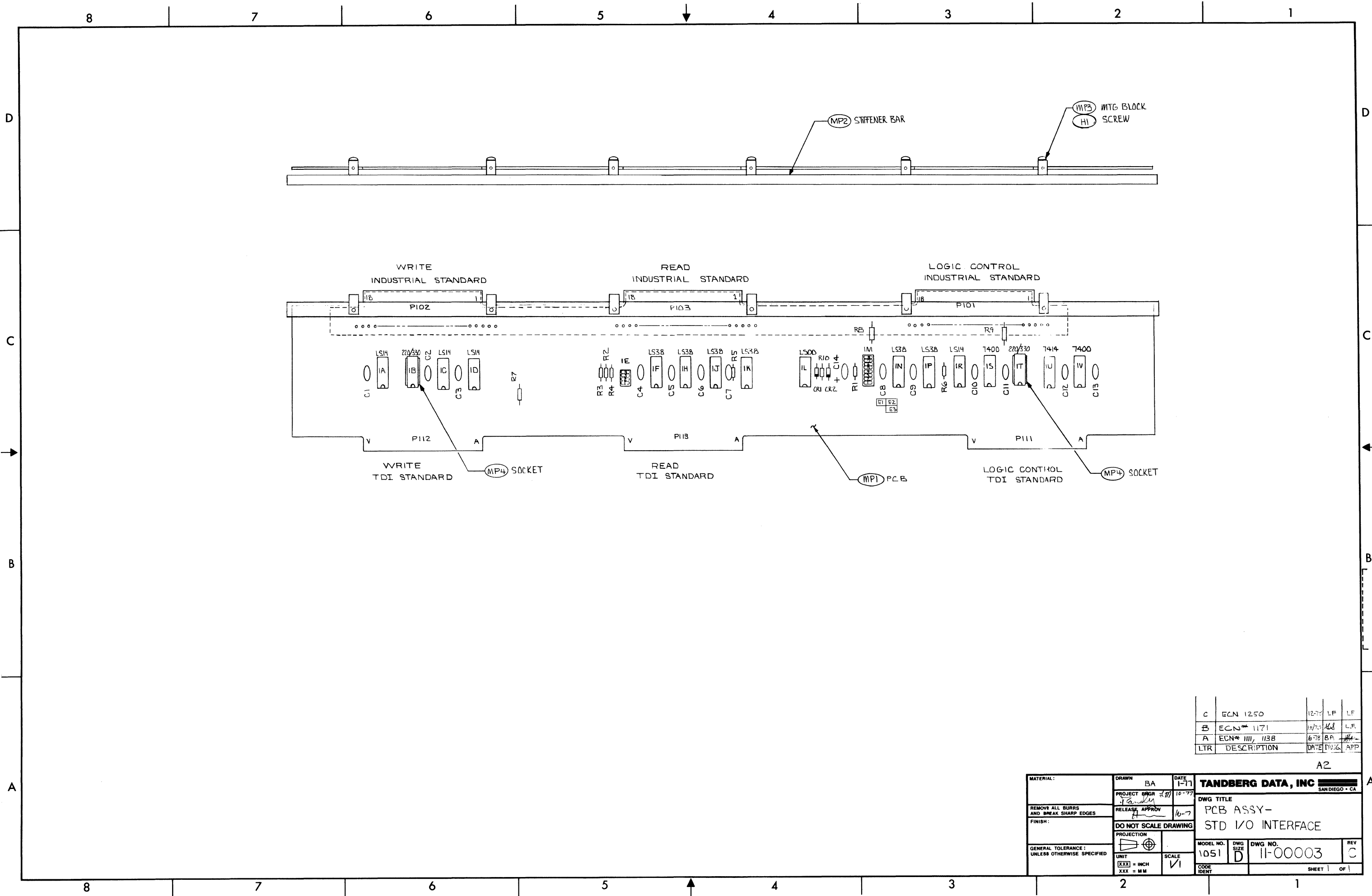


WRITE
RECORD HEAD
TDI SPEC
NO. 99-00004

P14 WRITE CONNECTOR
VIEW FROM COMPONENT
SIDE OF PCB

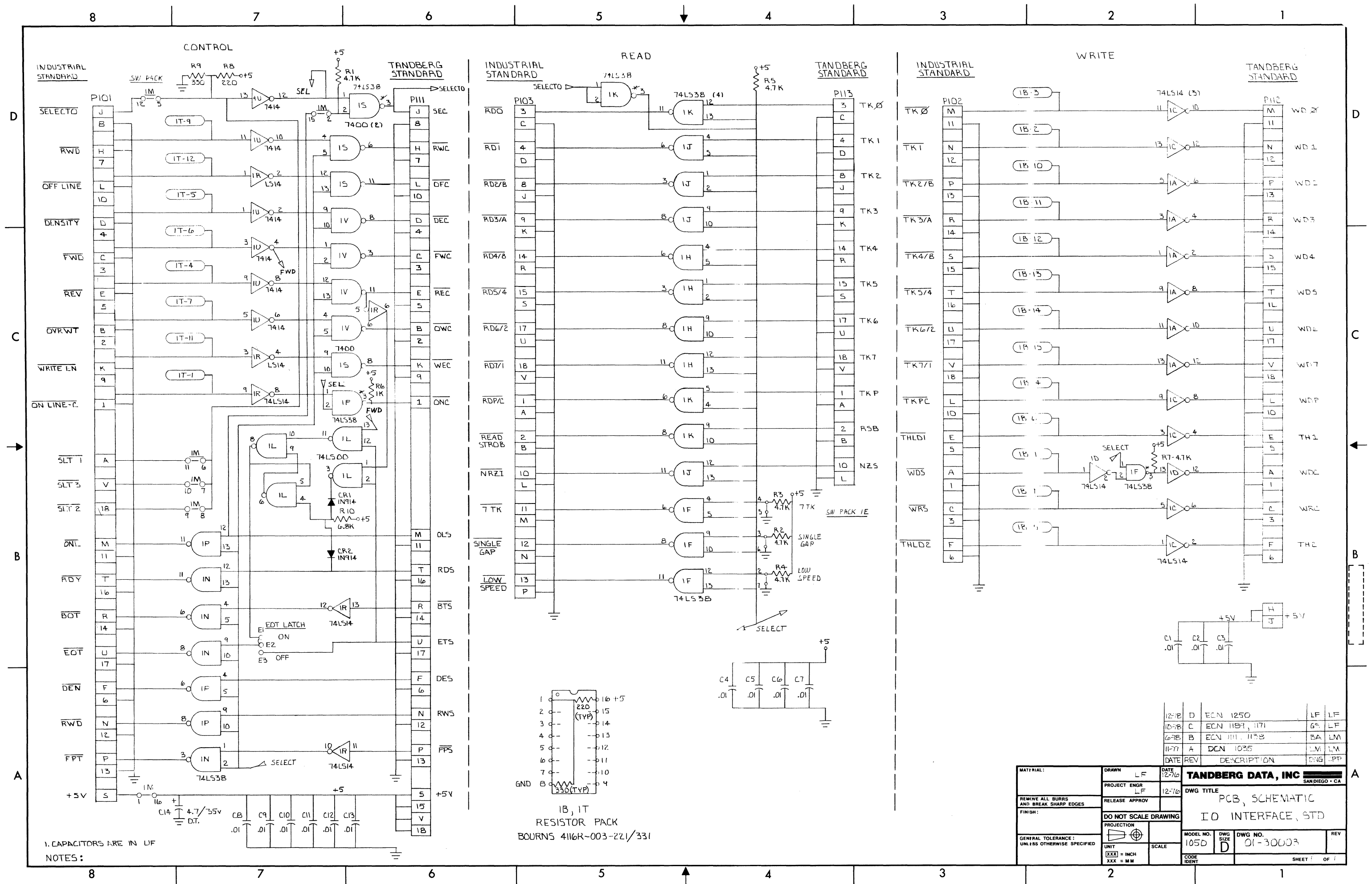
NOT USED	LAST USED
CR167	THIS SMT R332 R621 CR173 C158 C300 CR163 C300 Q48 C150-C237 Q43 C283-C37

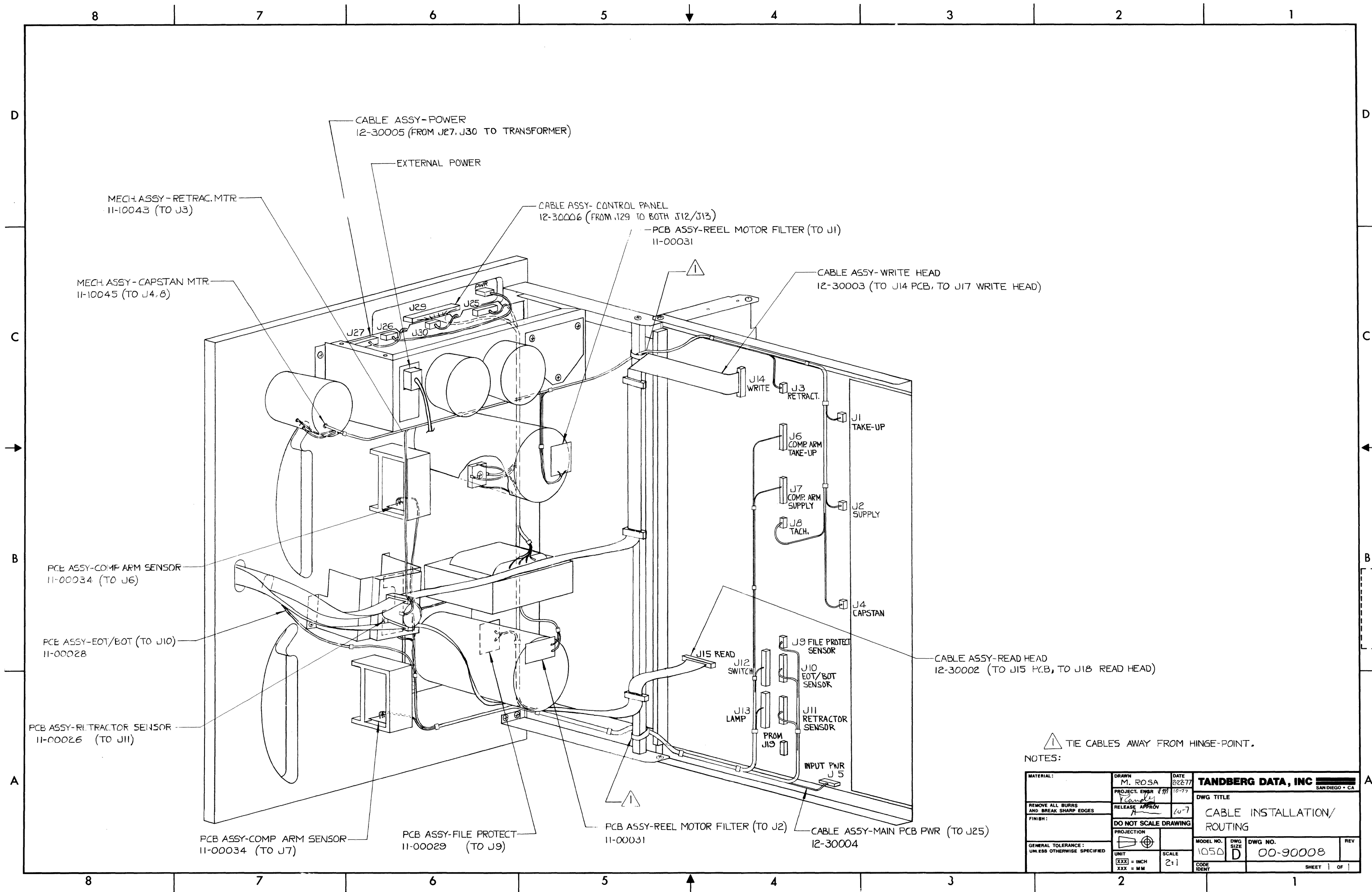
MATERIAL:		DRAWN: M. ROSA		DATE: 4-18-77		TANDBERG DATA, INC.	
REMOVE ALL BURRS AND BREAK SHARP EDGES		PROJECT ENGR:		4-18-77		SAN DIEGO - CA	
FINISH:		RELEASE APPROV:		DO NOT SCALE DRAWING		DWG TITLE	
GENERAL TOLERANCE: UNLESS OTHERWISE SPECIFIED		PROJECTION:		SCALE:		PCB, SCHEMATIC MAIN ELECTRONICS WRITE	
UNIT: XXX = INCH XXX = MM		MODEL NO. 1050		DWG NO. 01-30075		REV. 2	
CODE IDENT		SHEET 5 OF 5					



C	ECN 1250	12-77	LF	LF
B	ECN* 1171	10-77	LF	LF
A	ECN* 1111, 1138	6-78	BA	LF
LTR	DESCRIPTION	DATE	DWG	APP

MATERIAL:		DRAWN	BA	DATE	1-77	TANDBERG DATA, INC		SAN DIEGO - CA	
PROJECT		ENGR	2/77	10-77		DWG TITLE			
RELEASE		APPROV	10-77	10-77		PCB ASSY- STD I/O INTERFACE			
FINISH:		DO NOT SCALE DRAWING				MODEL NO.			
GENERAL TOLERANCE:		UNLESS OTHERWISE SPECIFIED				DWG NO.			
UNIT		XXX = INCH				SCALE			
XXX = MM		SCALE				UNIT			
CODE		IDENT				SHEET 1 OF 1			

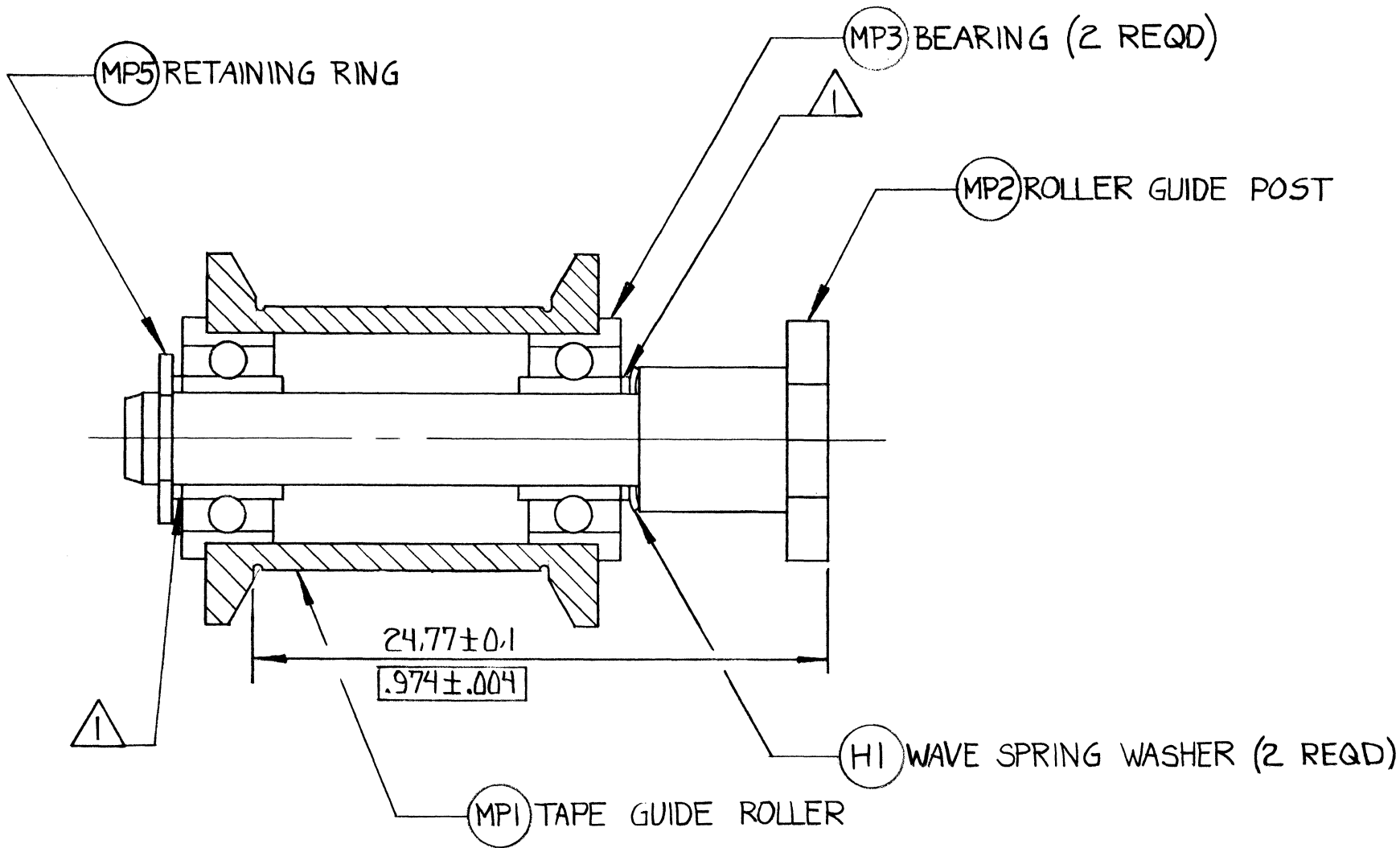




⚠ TIE CABLES AWAY FROM HINGE-POINT.
NOTES:

MATERIAL:	DRAWN M. ROSA		DATE 8-28-77		TANDBERG DATA, INC SAN DIEGO • CA	
	PROJECT ENGR M. ROSA		10-77			
REMOVE ALL BURRS AND BREAK SHARP EDGES	RELEASE APPROV A		10-7		DWG TITLE CABLE INSTALLATION/ ROUTING	
FINISH:	DO NOT SCALE DRAWING		PROJECTION 			
GENERAL TOLERANCE : UNLESS OTHERWISE SPECIFIED	UNIT XXX = INCH XXX = MM	SCALE 2:1	MODEL NO. 1050	DWG SIZE D	DWG NO. 00-90008	REV
			CODE IDENT		SHEET	OF

LTR	DESCRIPTION	DWN	APP
A	ECN#1014	MAE	✓



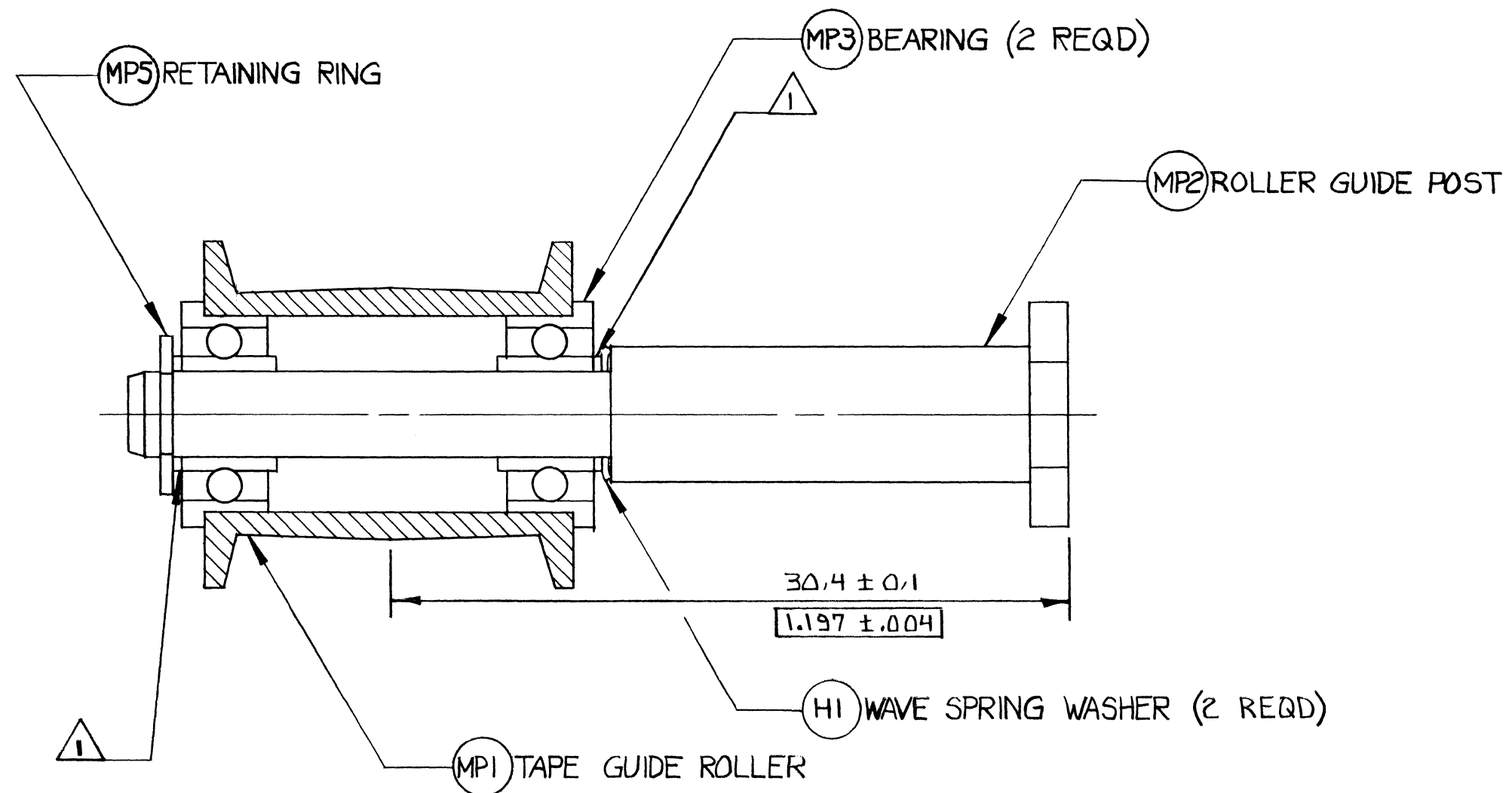
A104

1. SHIM ABOVE WAVE SPRINGS AND BELOW RETAINING RING AS REQ'D TO ACHIVE A BASE TO ROLLER FLANGE DIMENSION OF 24.77 ± 0.1 $.974 \pm .004$. FOR PROPER WAVE SPRING COMPRESSION, THE TOTAL THICKNESS OF SHIMS USED MUST EQUAL 0.64 ± 0.05 $.025 \pm .002$

NOTES:

MATERIAL:	DRAWN M. ROSA	DATE 11-30-74	TANDBERG DATA, INC SAN DIEGO • CA	
	PROJECT ENGR ZMM	10-5-77 12/6/77		
REMOVE ALL BURRS AND BREAK SHARP EDGES	RELEASE	APPROV 107	DWG TITLE ROLLER TAPE GUIDE ASSY TOP PLATE	
FINISH:	DO NOT SCALE DRAWING		MODEL NO. 1050	REV A
GENERAL TOLERANCE: UNLESS OTHERWISE SPECIFIED	PROJECTION 	SCALE 4 X	DWG NO. 11-10030	
	UNIT XXX = INCH XXX = MM		CODE IDENT	SHEET 1 OF 1

LTR	DESCRIPTION	DWG	APP
A	ECN* 1013	WAE	YZ



A105

1. SHIM ABOVE WAVE SPRINGS AND BELOW RETAINING RING AS REQ'D TO ACHIVE A BASE TO ROLLER DRUM CROWN DIMENSION OF 30.4 ± 0.1 $[1.197 \pm .004]$. FOR PROPER WAVE SPRING COMPRESSION, THE TOTAL THICKNESS OF SHIMS USED MUST EQUAL 0.64 ± 0.05 $[.025 \pm .002]$

NOTES:

MATERIAL:	DRAWN M. ROSA	DATE 11-30-74	TANDBERG DATA, INC SAN DIEGO • CA		
	PROJECT ENGR XBO	10-8-77 10/6/77			
REMOVE ALL BURRS AND BREAK SHARP EDGES	RELEASE H	APPROV 10-7	DWG TITLE ROLLER TAPE GUIDE ASSY COMP. ARM		
FINISH:	DO NOT SCALE DRAWING				
GENERAL TOLERANCE: UNLESS OTHERWISE SPECIFIED	PROJECTION 	SCALE 4X	MODEL NO. 1050	DWG NO. 11-10031	REV A
	UNIT XXX = INCH XXX = MM		CODE IDENT	SHEET 1 OF 1	

8 7 6 5 4 3 2 1

D

C

B

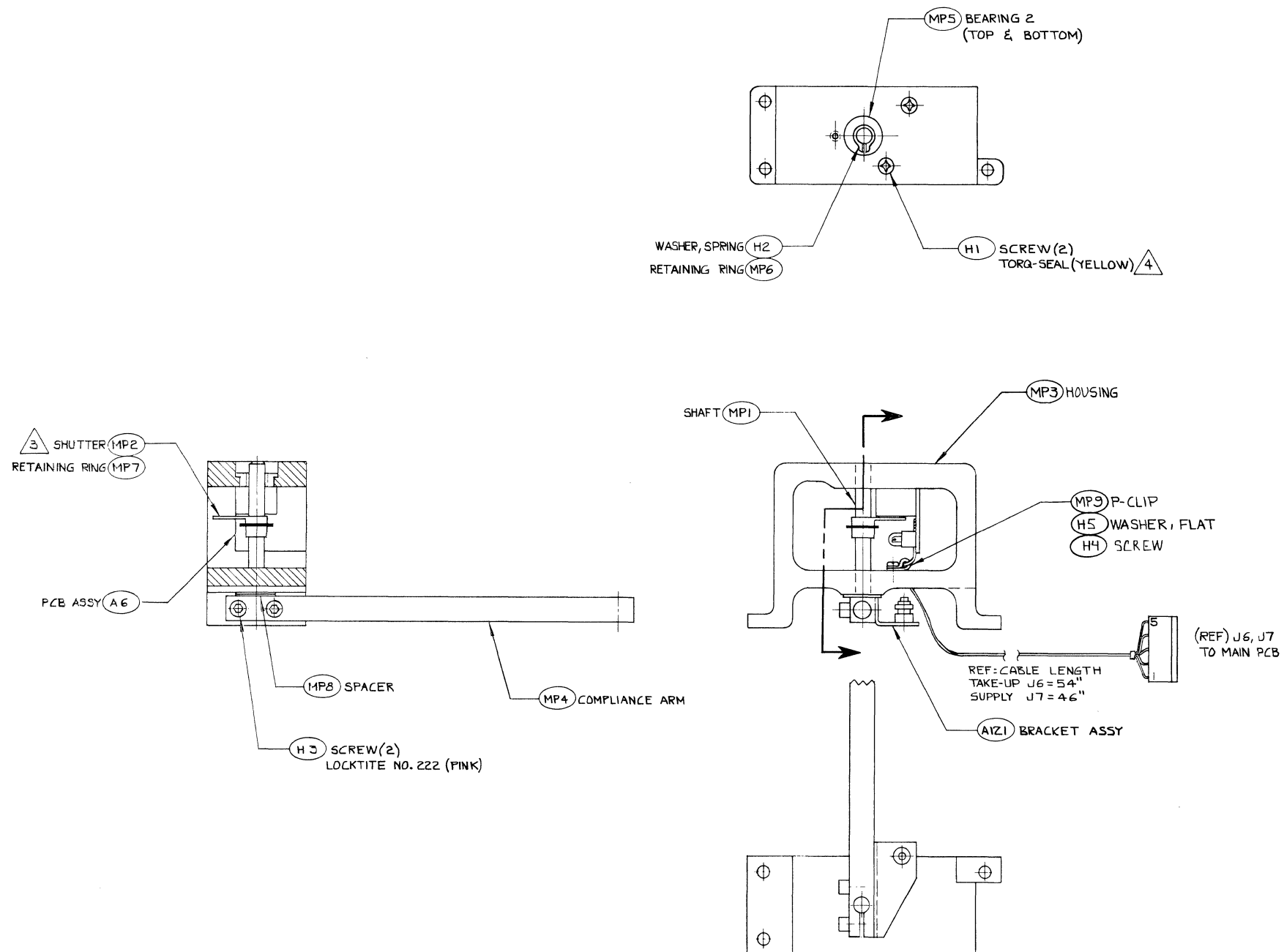
A

D

C

B

A



- NOTES:
- 5 TIE-WRAP TO ACT AS STRAIN RELIEF IN CONJUNCTION WITH TAG MP10.
 - 4 APPLY TORQ-SEAL (YELLOW) AFTER ALIGNMENT.
 - 3 SENSOR TO SHUTTER SPACING $0.18 - 0.20$.
[.007] [.008]
 - 2. ALIGN SENSOR TO ATTAIN LINEAR OUTPUT USING FIXTURE 98-XXXXX.
 - 1 TIGHTEN SCREWS AFTER RELOADING BEARING BY COMPRESSING
SPRING WASHER H2 $0.38 - 0.51$.
[.015] [.020]

J6 = TAKE-UP SERVO AIII-T
J7 = SUPPLY SERVO AIII-S

MATERIAL:	DRAWN <i>M. Reed</i>	DATE 2-23-77	TANDBERG DATA, INC SAN DIEGO - CA	
	PROJECT ENGR <i>JLB</i>	10-77		
REMOVE ALL BURRS AND BREAK SHARP EDGES	RELEASE <i>JLB</i>	APPROV <i>JLB</i>	DWG TITLE MECH. ASSY- COMPLIANCE ARM	
FINISH:	DO NOT SCALE DRAWING		MODEL NO.	DWG NO.
GENERAL TOLERANCE: UNLESS OTHERWISE SPECIFIED	UNIT [XXX] = INCH XXX = MM	SCALE FULL	DWG SIZE D	11-10040
PROJECTION [Symbol]			CODE IDENT	REV
			SHEET 1 OF 1	

8

7

6

5

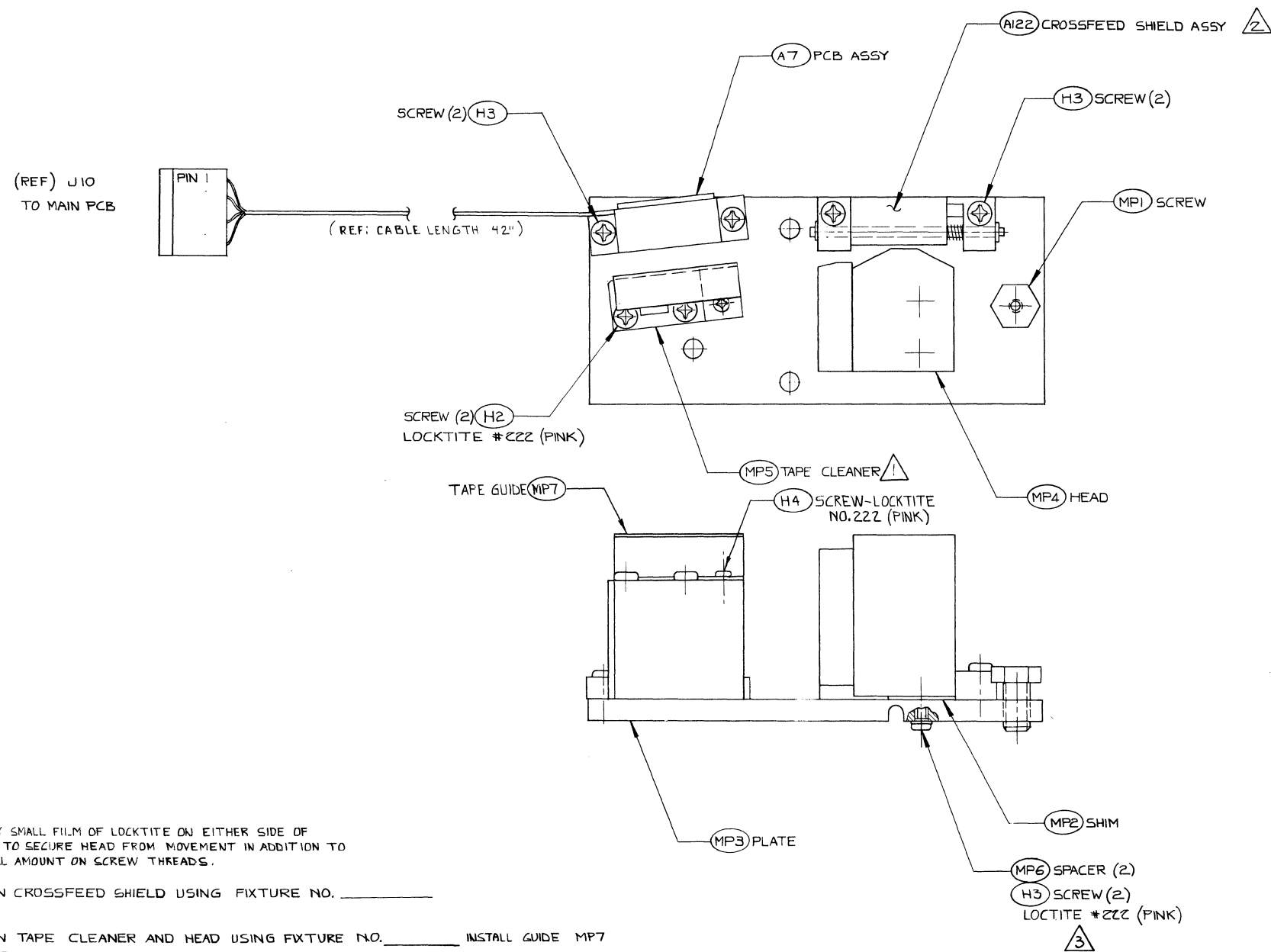
4

3

2

1

LTR	DESCRIPTION	DWG	APP
A	ECN # 1105	VP	VP

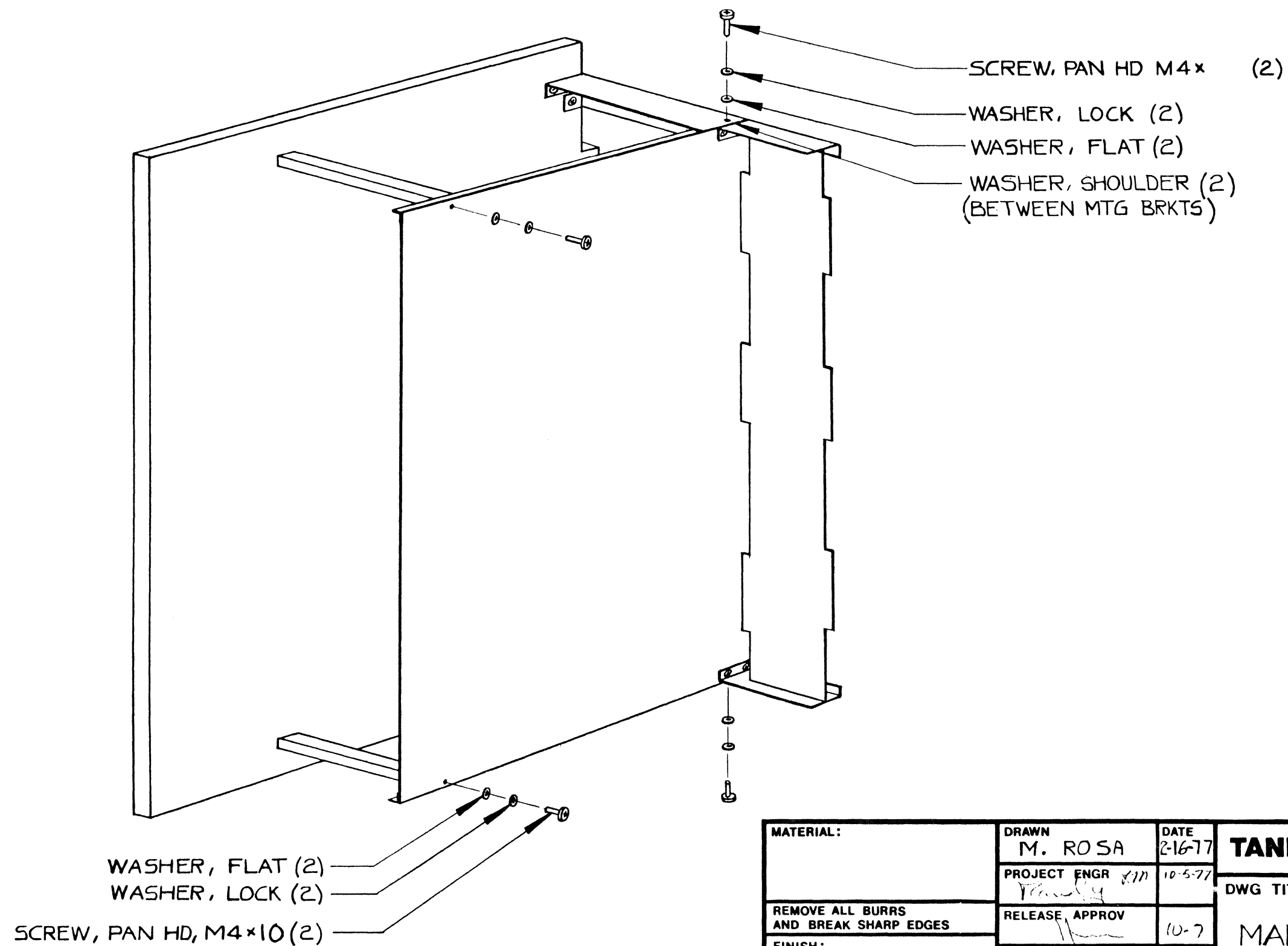


- 3 APPLY SMALL FILM OF LOCKTITE ON EITHER SIDE OF SHIM TO SECURE HEAD FROM MOVEMENT IN ADDITION TO SMALL AMOUNT ON SCREW THREADS.
- 2 ALIGN CROSSFEED SHIELD USING FIXTURE NO. _____
- 1 ALIGN TAPE CLEANER AND HEAD USING FIXTURE NO. _____ INSTALL GUIDE MP7 ON TOP OF TAPE CLEANERS USING SCREW H4 AFTER ALIGNMENT.

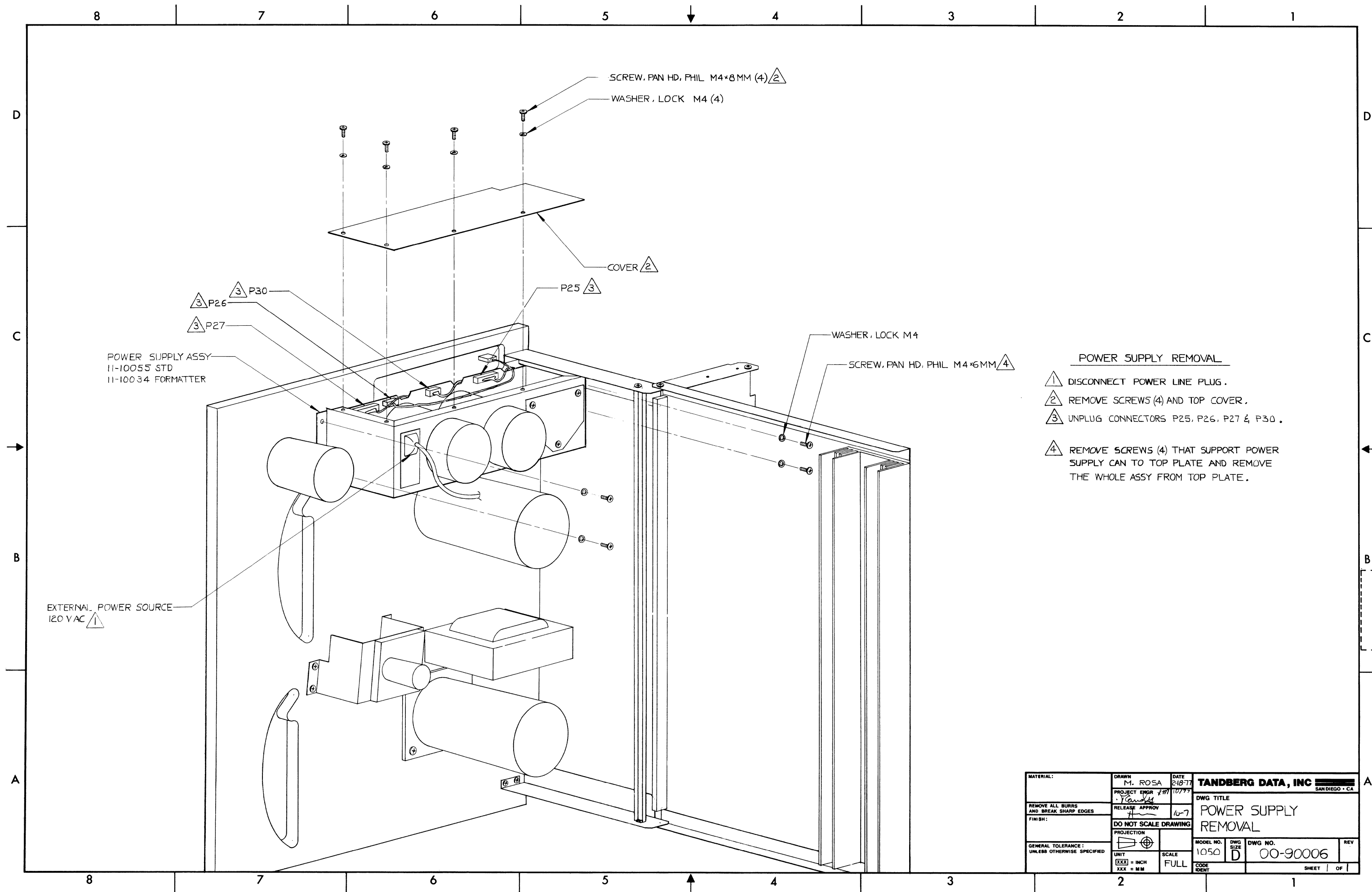
NOTES:

A112

MATERIAL:	DRAWN M. ROSA	DATE 3-11-77	TANDBERG DATA, INC SAN DIEGO, CA	
REMOVE ALL BURRS AND BREAK SHARP EDGES	PROJECT ENGR KBD	10-77 10/4/77	DWG TITLE MECH. ASSY — HEAD PLATE	
FINISH:	RELEASE APPROV H	4-7	DO NOT SCALE DRAWING	
GENERAL TOLERANCE: UNLESS OTHERWISE SPECIFIED	PROJECTION 1st angle	SCALE 2 X	MODEL NO. D	DWG NO. 11-10041
	UNIT XXX = INCH XXX = MM		CODE IDENT	REV A
			SHEET	OF



MATERIAL:	DRAWN M. ROSA	DATE 2-16-77	TANDBERG DATA, INC SAN DIEGO • CA			
	PROJECT ENGR <i>Therby</i>	10-5-77				
REMOVE ALL BURRS AND BREAK SHARP EDGES	RELEASE APPROV <i>[Signature]</i>	10-7	DWG TITLE MAIN PCB REMOVAL			
FINISH:	DO NOT SCALE DRAWING					
GENERAL TOLERANCE: UNLESS OTHERWISE SPECIFIED	PROJECTION 		MODEL NO. 1050	DWG SIZE B	DWG NO. 00-90005	REV
	UNIT [] = INCH [] = MM	SCALE 1:4	CODE IDENT			
	SHEET 1 OF 1					



MATERIAL:	DRAWN M. ROSA		DATE 2-18-77		TANDBERG DATA, INC SAN DIEGO • CA			
	PROJECT EMGR 1/77 10/7/77							
REMOVE ALL BURRS AND BREAK SHARP EDGES	RELEASE APPROV [Signature]		10-7		DWG TITLE POWER SUPPLY REMOVAL			
	DO NOT SCALE DRAWING							
FINISH:	PROJECTION 				MODEL NO. 1050	DWG SIZE D	DWG NO. 00-90006	REV
GENERAL TOLERANCE : UNLESS OTHERWISE SPECIFIED	UNIT [XXX] = INCH [XXX] = MM		SCALE FULL		CODE IDENT		SHEET	OF